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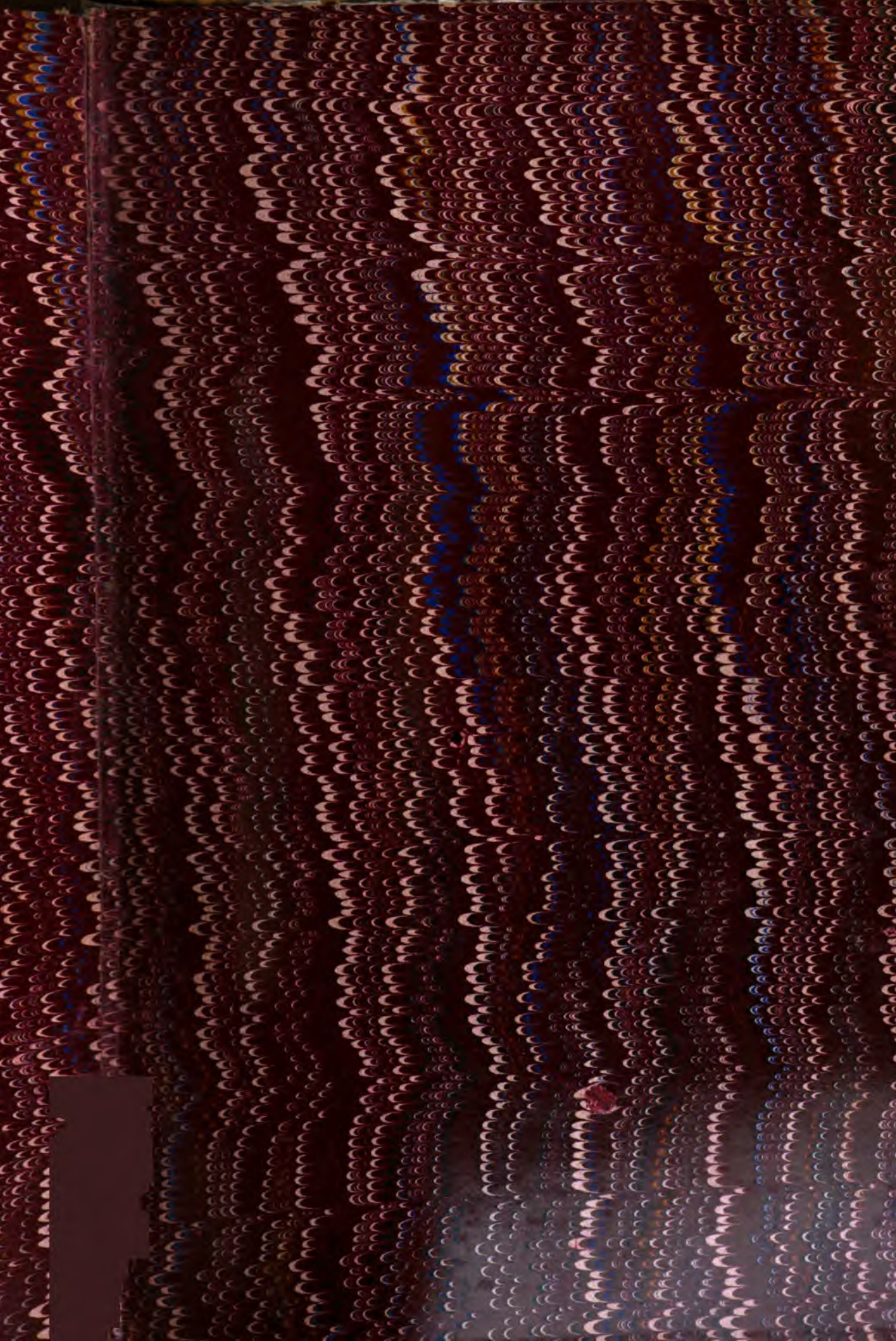

GROUP OF ANTIS (PERUVIAN CAMPOS).

THE

EARTH AND ITS INHABITANTS.

SOUTH AMERICA.

BY

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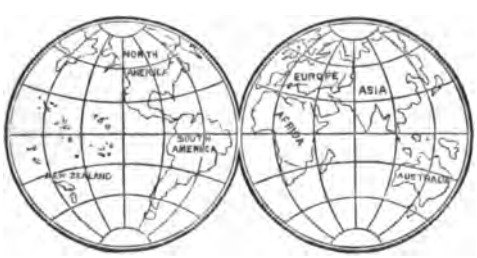

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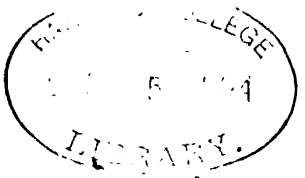

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THE EARTH AND ITS INHABITANTS.

SOUTH AMERICA—THE ANDES REGIONS.

CHAPTER I.

GENERAL SURVEY OF THE CONTINENT.

I.

A BIRD'S-EYE view of South America shows that it forms the eastern termination of the continental lands describing a vast semicircle round the Pacific basin. This section of the oceanic periphery presents far greater regularity in its orographic development than any other region of the globe. Neither in Africa, in Asia, nor in North America do the mountain ranges and masses skirting the ocean at varying distances display such an unbroken line of uplands, nor do they preserve more strictly the aspect of coast ranges.

The Andes differ also from all other continental systems, such as the Alps, Himalayas, and Rocky Mountains, in their far greater relative importance to the respective regions above which they rise. The mean altitude of South America, regarded as a solid mass with perfectly horizontal surface, was estimated by Humboldt at 1,150 feet. But according to later and more accurate researches based on more detailed cartographic documents, the continental altitude should be raised to 1,312 feet, of which about 820 feet should be assigned to the mass of the Andes system in an equal distribution over all the land standing above sea-level.

Configuration of the Continent.

The form of South America, as compared with that of the other continents, is one of those topics that have been most frequently discussed by geographers. The analogy presented by the contour-lines of the southern section of the New World with those of Africa and Australia had already been noticed by Buffon and other

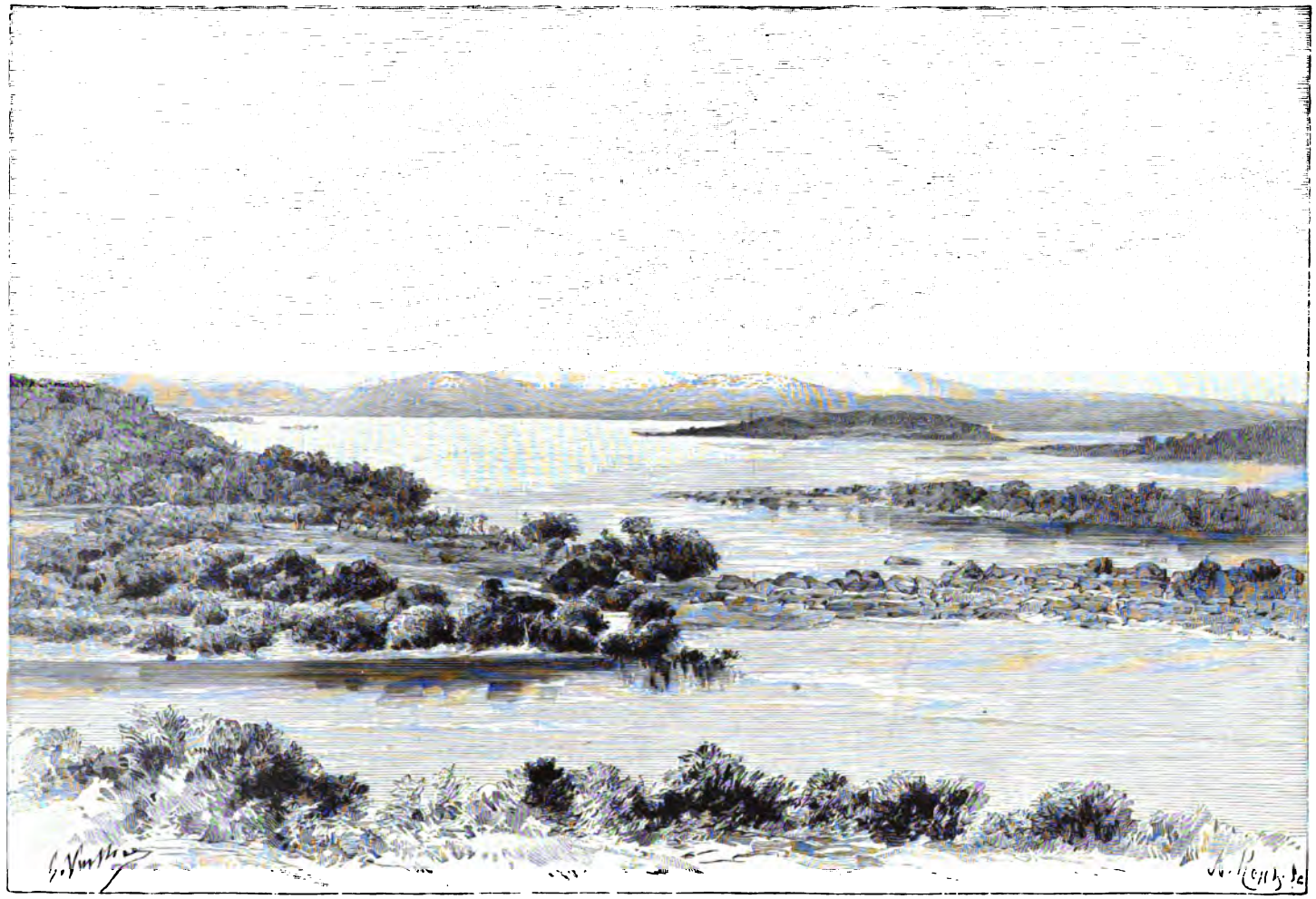
observers in the last century. Favourite subjects of comment have been the contrasts offered by the three continental regions of the southern hemisphere to those of the north, not only in their more massive outlines, less indented by marine inlets, less diversified by great peninsulas, but also in other salient physical features, as well as in their respective geographical positions. Attention has likewise been called to the harmonious correspondence in the general disposition of Africa and South America, their great fluvial basins facing each other, their most advanced headlands of Upper Guinea and Brazil projecting from either side of the Atlantic as if to meet in mid-ocean.

Nor have physical geographers failed to notice the resemblance in the contour-lines of the two main sections of the New World itself, both of triangular form, with apex pointing southwards, and with orographic and hydrographic systems presenting many features in common. Here the chief contrasts between the northern and southern divisions are, in fact, mainly due to the differences of latitude, compared with which the diversities of outline are of relatively slight importance. Such diversities, however, require to be carefully noted. South America, with far more clearly marked periphery, is sharply limited in the north-west by the fluvial valley of the Atrato, which is connected by a very low pass with the marshy gulf of San Juan. Thus the continent, taken as a whole, may be regarded as a vast insular region somewhat analogous to Australia.

Far more irregular in its broad outlines is the North American continent, which tapers southwards through the long sinuous stem of Central America forming a prolongation of the Mexican uplands. At its opposite extremity the northern coastlands are intermingled with a labyrinth of large islands and archipelagoes, clothed for the greater part of the year with a snowy mantle, and soldered together by a continuous icecap. In this direction the dimensions of the North American seaboard can scarcely be accurately determined, the extremely vague estimates of its actual extent depending on summary and in part contradictory surveys. In fact, the northern regions are merged, so to say, in the mysterious waters of the Arctic seas. Hence the northern division of the New World, although occupying a larger superficial area, is inferior to the southern continent in the extent of its habitable lands. Not more than two-thirds of its surface is really at the service of civilised man.

The Seaboard.

Till recently all geographers, in common with Carl Ritter, pointed to the more diversified character of its coast-lines as a great advantage enjoyed by the northern over the southern continent. One-half of its seaboard abounds in islands and peninsulas, such as the Polar Archipelago, the Aleutian group, the West Indies, California, Florida, and Central America, whereas the southern continent presents a scarcely indented coast-line, with but few and small peninsulas, unless the Patagonian extremity itself may be considered as a sort of peninsular region. The islands, nowhere numerous except on the austral coasts, are disposed close to the mainland, so as to scarcely disturb the general uniformity of the shore-lines.



ATURES RAPIDS, ORINOCO; VIEW TAKEN AT THE CERRO PERRIQUITO.

Nevertheless, this difference in the relative proportion of indentations and archipelagoes fringing the two continents does not possess the importance which has been claimed for it. An abundance of islands and peninsulas does not necessarily constitute an advantage in itself, and may even be a drawback. Everything, in fact, depends on the special conditions presented by each of the geographical divisions. Thus the West Indies have become the "Jewel of the New World," thanks to their happy position at the confluence of the oceanic currents and in the forefront of the Caribbean Sea; thanks also to their climate, to their natural resources, and to the facilities of communication from port to port.

But the snowy lands of the Far North, washed by the Frozen Ocean, remain absolutely uninhabitable; nor is it likely that they can ever attract any settlers. They may at most continue to be visited by seekers for gold and peltries, or by a few travellers anxious to study nature under its sternest aspects of dreariness and desolation. On the other hand, the North American peninsulas, such as Nova Scotia, South California, and even Florida, are far from possessing the same economic value for intending immigrants as the mainland itself.

River Systems.

But in both continental divisions the marine inlets, offering points of easy access to navigation, are increased ten or even a hundred fold by the network of fluvial or lacustrine arteries ramifying throughout the interior. In this respect the twin continents are equally favoured in comparison with the various sections of the Old World. South America certainly lacks the vast fresh-water basins characteristic of the North; even Titicaca, its largest lake, although traversed by small vessels, is an isolated basin in an upland depression of the Andes, unconnected with any other lines of communication by water. But to the ramifying system of the Mississippi, with its 17,000 or 18,000 miles of navigable highways, South America may oppose the Amazons, largest river on the surface of the globe, with a development of deep channels at least twice as extensive as that of the Mississippi basin.

To this vast network of inland waterways must be added the Orinoco basin, which also abounds in navigable streams, and the River Plate system, which includes the Paraguay, Parana, and Uruguay, and which rivals the Mississippi itself in the extent of its convergent watercourses. Moreover, South America is distinguished amongst all the continents by the absence of clear parting-lines between its great fluvial basins. To a certain extent all the hydrographic systems from the Orinoco delta to the La Plata estuary may be said to be merged in a single fluvial basin.

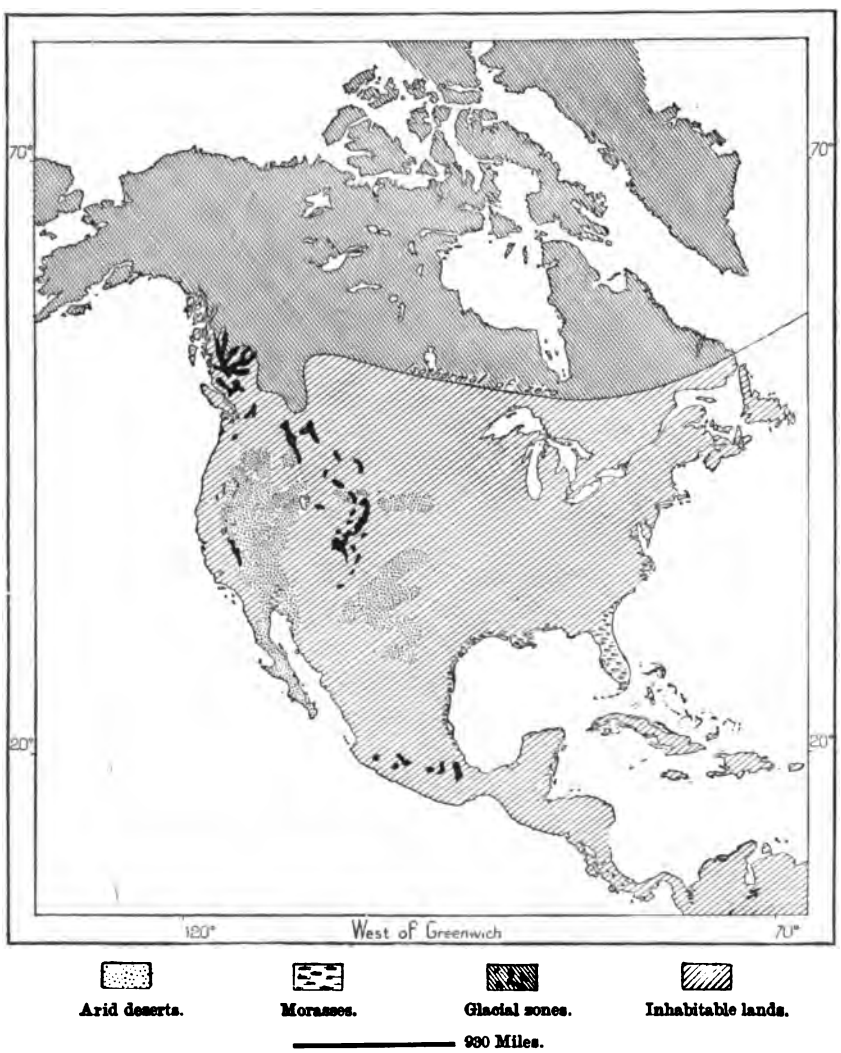
So far as regards the Orinoco and the Amazons, the union is complete, thanks to the ramifying waters of the upper Orinoco, which are discharged in one direction southwards through the Cassiquiare, and in another straight to the Atlantic and the Gulf of Paria, forcing their way at the Maipures and Atures rapids over the rocky remains of eroded mountain barriers.

Although between the Amazons and La Plata basins the communications are

more obstructed, the water-parting presents at various points certain tracts of undecided slope, where the spring or swamp waters flow now in one direction, now in another, according to the set of the winds, the abundance of local rains, the alluvial deposits, or the effects of landslips. At the foot of the Bolivian Andes the various branches of the Mamoré and Pilcomayo seem interlaced, and lower down the level plains are dotted over with marshy tracts, whose

Fig. 1.—Inhabitable Regions in North America.

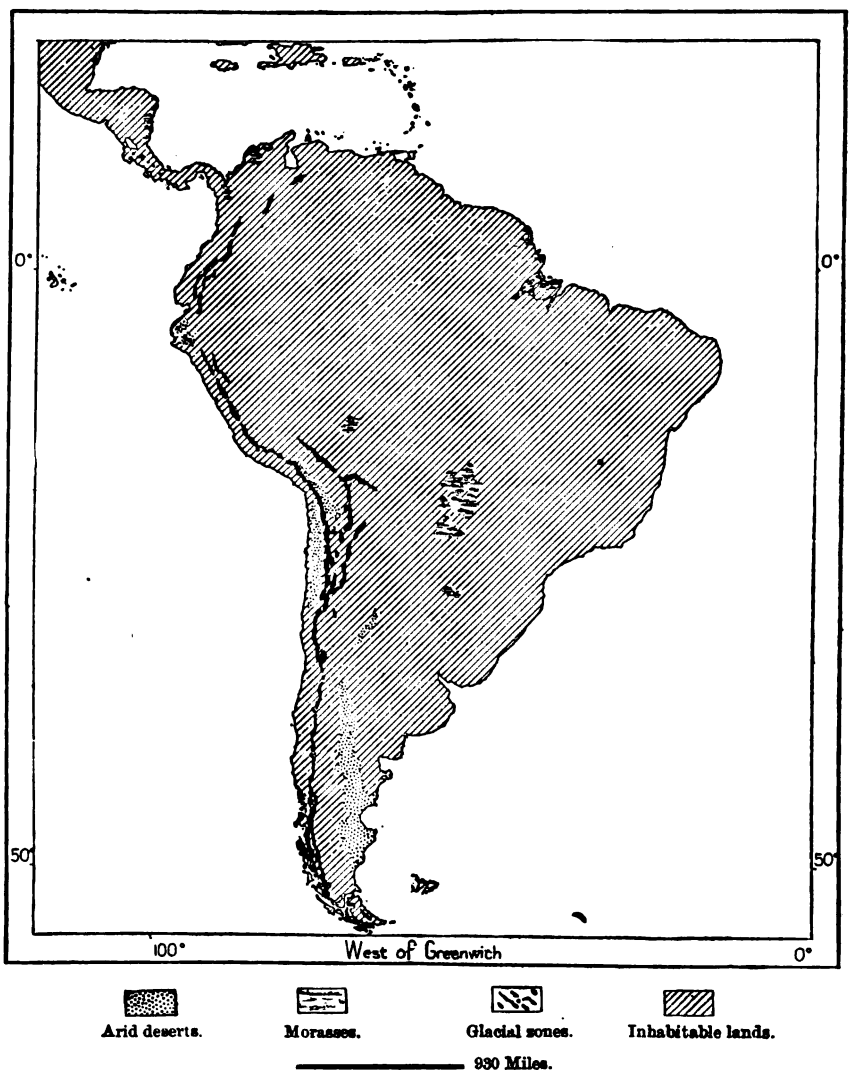
Scale 1 : 70,000,000.



sluggish waters drain to both basins. In the heart of the continent the upper affluents of the Guaporé and the Jaurú are merged together during the rainy season. The Rio Alegre, a tributary of the Amazons, has its source on the southern slope of the continent, and traverses a marshy parting-line before sweeping round the Serra Agoapehy range of hills on its northern course to the Guaporé. Nothing would be easier than to establish a permanent connection

between the two fluvial systems, either by a series of portages, or by cutting a canal four or five miles long across the divide. Other interminglings of river basins have also been developed farther east between the eastern affluents of the Paraguay and the Arinos, a main branch of the Amazonian Tapajoz, and attempts to connect them by cuttings were made in the years 1713 and 1845.

Fig. 2.—Inhabitable Regions in South America.
Scale 1 : 70,000,000.



Viewed as a whole, the South American hydrographic system is remarkable for the prodigious volumes which are carried seawards by the main arteries, and much of which expands in the interior, not into deep lacustrine depressions, but in lateral backwaters and labyrinths of temporary channels, varying from year to year, and from season to season, with the periodical flooding and subsidence of the main streams.

Geologists who have studied the contours and general incline of these inland regions find that the movement of waters has been developed in two principal directions, one parallel with the meridian, and indicated chiefly by the trend of the Paraguay and of the Parana, the other intersecting the first at right angles, and flowing from the Andes to the Atlantic. The Amazons, a "liquid equator," as it has been called, follows the main axis of this second hydrographic system. The aspect presented by the semicircle of the Andes between the Bogota and Bolivian plateaux attests the vast work of erosion that has been accomplished in this upland region. The eastern slope of the Cordilleras has evidently been eaten away by the running waters to an enormous extent; numerous lateral ridges have been entirely levelled, and their triturated debris has been distributed by the streams over the beds of great inland seas, which at one time occupied the central region of the continent. The sedimentary matter thus carried down towards the fluvial estuaries was regarded by Humboldt as of old red sandstone origin, while Martins attributed it to triassic formations. But in reality these deposits are comparatively recent quaternary clays and sands, and according to Agassiz are partly of glacial origin.

The part of the Andean system that has best resisted the fluvial action is the huge mass of the Bolivian uplands. This central fortress of the South American rampart is no less than 500 miles broad between the escarpments which plunge into the waters of the Pacific and the eastern plains still roamed by the nomad Indians; but a little farther north, in the very axis of the Amazons, under 3° south latitude, the main range of the Cordilleras is reduced to a thickness of scarcely more than 120 miles.

East of Bolivia the headstreams, which trend some to the Amazons, some to the Paraguay basin, have not been strong enough to sweep away the Andean foothills. Along the parting-line the expanse of level plains intervening between the paleozoic Andean rocks and those of the Brazilian plateaux has a normal breadth of no more than 250 miles; towards the centre it is studded with numerous hills and isolated ridges, surviving witnesses of the crystalline nucleus and other formations which at one time occupied the whole continent from sea to sea. The passages which the Amazons and the Orinoco have had to cut for themselves through the coast ranges are much narrower still than this central depression. Between the Tapajoz and Xingu mouths the Amazons valley is scarcely 60 miles broad from hill to hill.

Forests and Habitable Lands.

The enormous excess of pluvial waters which distinguishes the southern continent, and which has created this astonishing system of ramifying streams, has, however, conferred little more than a nominal advantage on its inhabitants, at least in the equatorial zone. Such liquid masses are too copious, too irregular in their regime to be controlled by man, who till recently has scarcely been able to utilise them even for navigation. Moreover, the tepid and oppressive climate has hitherto been opposed to the acclimatisation of the white and half-

caste races in large numbers. The soil, with its excessive fertility, has clothed itself with continuous woodlands, a tangled mass of vegetation overflowing with sap, where whole generations will be unable to effect more that a few narrow clearings.

The Amazonian forest, which the Spaniards call the *Selva* in a pre-eminent sense, and which is continued southwards by the *Matto Grosso* of the Portuguese, covers a space estimated at 2,800,000 square miles. In this boundless expanse travellers, and even the seekers for rubber, ipecacuanha and other medicinal or economic products, have for the most part no knowledge of the Selva beyond the winding avenues opened in its shade by the rivers and backwaters. This densely timbered and almost uninhabited region separates the low-lying Venezuelan plains from those of Bolivia more effectually than if it were an absolute desert.

Thus, despite its immense wastes of snow and ice, despite its tundras of mosses and lichens, which occupy about one-third of its whole area, North America offers at the present day a far more favourable territory for settlement than the southern continent. Its chief advantage is that the temperate zone, which is best suited for the development and prosperity of the white race, comprises its broader part, where the United States have been constituted. In South America, on the contrary, the corresponding section begins where the land, already considerably contracted between the two oceans, continues to taper rapidly in the direction of the austral seas. Measured on Berghmann's map by the isothermal lines of 46° and 68° Fahr., this climatic zone comprises over 4,000,000 square miles in the northern, and somewhat less than 2,000,000 in the southern continent.

Communications.

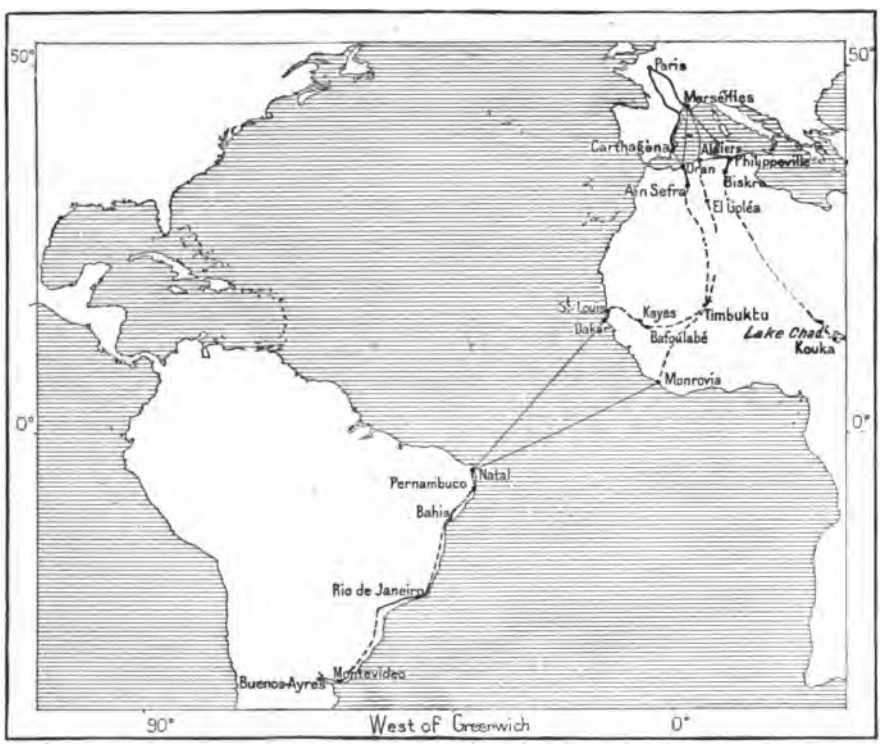
Another disadvantage of the South compared with the North as a region of colonisation results from its more remote position from the other great divisions of the globe. Apart from the Antarctic polar lands, South America is farther removed than any other continental region from the great commercial marts, and from the most densely-peopled countries—West Europe, India, and China—whose central point about coincides with the middle of the Eastern Hemisphere. Nevertheless, steam has helped greatly to shorten the time formerly occupied in the voyage from the European Atlantic ports to those of Colombia, Brazil, and Argentina. With the resources supplied by the mechanical arts, it may even be possible in the near future to bring the eastern ports of Brazil practically as near to London and Paris as are New York and Montreal at present.

The South American coastlands are already directly connected by regular lines of steamships with those of Europe, but the construction of the projected north-west African railways may even reduce by one-half the journey between these points. In this respect the "Trans-Saharan" trunk line should be regarded as of more importance for South America than for Europe. Some French speculators, inspired more by colonial patriotism than by economic interests, are at present occupied with various schemes for connecting by rail the Mediterranean seaboard with the Sahara, Sudan, and Senegal.

Doubtless a line running from Algiers to Lake Chad, and continued southwards to the Ubanghi and the Congo, would at some future time possess an undeniable value in developing and utilising the still untouched resources of those regions. But the lines already begun at Philippeville, Algiers, and Oran would, if continued south-westwards to Dakar, present the advantage of not only connecting Algeria and Senegal in a single commercial and political zone, but, as has already been pointed out by the engineers, would also serve to swell the great stream of international traffic between Europe and South America. Swift-sailing

Fig. 3.—Future Routes between Paris and Buenos Ayres.

Scale 1 : 110,000,000.



liners, such as those now plying between Liverpool and New York, could cross the Atlantic between Dakar and the Brazilian ports of Natal and Pernambuco in less than three days; and on this short route at one of the narrowest parts of the ocean, passengers would have the pleasure of sighting land twice, at the islands of São Paulo and Fernando Noronha. The great Transatlantic line connecting the three continents might also be continued by a coast railway from Pernambuco to Buenos Ayres, with branches ramifying into the interior of the continent. By this route, at the present speed of the most powerful engines, the traveller might

reach Buenos Ayres from Paris in eleven days, that is, in a third of the time occupied by existing lines.*

Exploration of the Seaboard.

The work of discovery, begun in North America centuries before the time of Columbus, was retarded in the southern continent by its greater distance from the populous and trading lands of the Old World. No Norse sea-rover ever landed on its shores; no legend anterior to the age of the great navigators speaks of mysterious islands dimly seen by monks wandering, like St. Brendan, in these remote waters of the austral hemisphere; the pretended Phœnician inscription said to have been found on the banks of the Parnahyba, in equatorial Brazil, was no more authentic than so many others reported from various parts of the New World.

The Spanish caravels had already been plying for six years in the West Indian waters, when Columbus, in 1498, reached the mainland near the Orinoco delta. He recognised the importance of this immense watercourse; but he explored none of its branches, and, escaping from the Gulf of Paria by one of the "Dragon's Mouths," where the marine currents clash, he hastily returned to his mines and plantations in Española.

Next year Peralonso Niño and Cristobal Guerra landed in their turn on the shores of the mainland, which they traced for some distance in the direction of the west, trading as they went with the natives. Then followed a few months later the memorable expedition of Hojeda, who was accompanied by the learned pilots, Juan de la Cosa and Amerigo Vespucci. The party extended its explorations for over 600 miles between the muddy shores of the present Guiana and the peninsula roamed by the Goajiros Indians, west of the Gulf of Maracaibo.

During the first two years of the sixteenth century Bastidas de Sevilla completed the survey of the Columbian coastlands as far as the Gulf of Uraba. About the same time the shores of the continent facing Africa were also visited by European navigators. Vicente Pinzon explored the coasts and fluvial estuaries of the Guianas, sailed into the "Freshwater Sea" encircling the Amazonian island of Marajo, and coasted the shores of the present Brazil to and beyond its easternmost headland of Cape São Roque. Diego de Lepe traversed the same waters, while Alvarez Cabral, striking the land at Porto Seguro farther south, reported the discovery of the "island" of Santa Cruz, which subsequent discoveries showed to be a part of the continental seaboard visited by his predecessors.

Then Amerigo Vespucci traced the coastline as far as the bay of Cananea, south of the present Brazil, and hither came Gonneville and other Normans of Dieppe

* Dimensions of South America according to Ch. Perron :—

Superficial area with adjacent and dependent islands	6,740,000 sq. miles.
Mean area of the other continents with their islands	8,950,000 sq. miles.
Coastline	18,000 miles.
Extreme length	4,500 miles.
Extreme breadth	3,100 miles.
Extreme distance from the centre to the coast	1,740 miles.

in search of spices.* These were soon followed by Vicente Pinzon and Diaz de Solis, who in 1509 entered a great river which six years later Solis surveyed more in detail. This was the vast southern estuary which receives the two rivers, Uruguay and Parana, and which was at first named the Rio de Solis. But when Sebastian Cabot discovered, in 1528, that the Parana branch led inland in the direction of the Peruvian silver-mines, the name was changed to that of the Rio de la Plata ("Silver River"), which the estuary still bears.

Magellan's memorable expedition of 1520-21 completed the discovery of the Atlantic coast of the New World as far as the entrance of the strait which separates the mainland from the Fuegian archipelago. Six years later, Francisco de Hoces, one of Loaysa's companions, coasted the seaboard without entering the strait, and thus reached the southern extremity of Tierra del Fuego close to the point where the two oceans intermingle their waters. But although the sailors taking part in the expedition unanimously declared that they had seen the "land's end," these shores were not accurately traced till the next century, when Le Maire rounded Cape Horn in 1616.

The west coast of South America being further removed from Europe, its survey was naturally subsequent to that of the Atlantic seaboard Thirty years followed the discovery of Guanahani before Andagoya, advancing beyond the Gulf of Panama, coasted the shores of the Pacific in the direction of the mysterious Biru, or Piru (Peru), which Francisco Pizarro went in search of two years later. In 1527 he reached Tumbez, its northernmost point, just below the Gulf of Guayaquil; and thenceforth the discovery of its shores and alpine coastlands went hand in hand with the conquest of the Peruvian empire. In 1534 Almagro had already pushed across the elevated plateau of the Andes and the Atacama desert as far as the northern districts of Chili.

In 1540 Valdivia penetrated still farther south along the narrow strip of Chilian coastlands between the crest of the Andes and the Pacific. But here all further exploration of the seaboard in the direction of Tierra del Fuego was long arrested. Little, in fact, was done before the present century beyond making a summary survey of the coast as seen from the ocean. A ship belonging to Loaysa's squadron had certainly passed through the Strait of Magellan towards Mexico so early as 1526, but its course lay too far seawards even to sight the coast of Chili. Fourteen years later Alonzo de Camargo, following in the same direction from the strait towards Callao, kept near enough inshore to determine the exact trend of the continent along the Pacific Ocean.

In 1579 Sarmiento, one of Spain's best pilots, made the voyage in the opposite direction from north to south, and the coastline, as traced by him, gave a tolerably correct reproduction of its true form. Drake, also, studying the best routes by which the Spanish settlements might be surprised, contributed not a little to a more accurate knowledge of the southern coastlands. Their exploration is still continued, and must last some time longer before complete surveys can be made of

* D'Avezac, *Nouvelles Annales des Voyages*, 1869.

the Chiloe and Fuegian archipelagoes, with all their intricate passages, projecting headlands, groups and chains of reefs and islands.

Exploration of the Interior.

If the cartography of the seaboard is not yet completed, that of the interior is even still more defective, despite the thousands of itineraries spread like a network over the well-known settled regions, and carefully reproduced in all their details on modern maps. The Conquistadores were the first explorers, and the geographical history of the continent begins with the reports of their expeditions. The Pizarros, the Almagros, the Valdivias, and their lieutenants brought under their dominion every city, every civilised tribe throughout the uplands and western valleys of the Peruvian and Chilian Andes.

Farther north, in the Venezuelan and Colombian regions, other captains and leaders of armed followers—Germans in the service of the bankers of Charles V., or Spanish adventurers in search of fresh conquests and new viceroyalties—also forced their way through savannas, across mountains and rivers, losing half or more of their followers on the march.

Alfinger, "cruellest of the cruel," roamed as a hunter of men the upland regions, where are intermingled the headwaters of the streams which flow in one direction to the Maracaibo inlet, in another towards the Rio Magdalena. Heredia, Cesar, Robledo, Fernandez de Lugo penetrated into the mountainous northern districts of the present Colombia. Fredemann, after traversing the overhanging cliffs between the Venezuelan seaboard and the plains of the Orinoco, retraced his steps to the coast, and then went in quest of the plateaux occupied by the empire of the Muyscas. When at last he reached this mysterious region beyond the forests, the river gorges and woodlands, he found himself, to his utter amazement, forestalled by other European conquerors who, in absolute ignorance of their rivals' movements, had penetrated by other routes to the same place. Quesada, starting from Santa Marta, had ascended the course of the Magdalena as far as the Opon confluence, whence he had made his way to the Cundinamarca plateau, while Belalcazar, at that time in Quito, had arrived at the same goal from an opposite direction by traversing the Tuquerres plateau and crossing the central Cordillera and the upper Magdalena. Like three vultures swooping down on the prey, they were fain, much to their regret, to share the booty between them.

These expeditions towards the capitals of empires, towards cities to which roads had been opened by the natives from time immemorial, were succeeded by an epoch of journeys made at haphazard towards visionary regions. Nothing seemed impossible to these men, who, after the first years of monotonous life in Spain, suddenly found themselves launched on a marvellous career of battles and triumphs, traversing seas and continents, and sweeping whole populations away as in a storm. All the doughty deeds related in their romances of chivalry they had themselves performed.

There remained nothing now but to crown their work with miraculous achievements, to triumph with magic weapons over dragons and demons, to

conquer golden palaces, paved with diamonds, and adorned with colonnades of glittering gems. Had not Columbus already declared that the Orinoco issued from the "Earthly Paradise"? And so they set out in quest of that marvellous land whence their first parents had been expelled by the archangel. No failure could damp their sanguine hopes or turn them aside from this pursuit of the unknown. Every Indian legend, every hallucination of wearied wayfarers, every fleeting mirage on the distant horizon, seemed in the eyes of the eager adventurers a fresh vision of the enchanted city where reigned the Man of Gold, the potent Dorado! For over a century all the expeditions made east of the Andes in the Orinoco and Amazons basins were directed or inspired by these fanciful visions.

One of the first of these treasure-seekers was the same Diego de Ordaz, companion of Cortez, who had already visited the crater of Popocatepetl in the hope of there finding liquid stores of the precious metals. In 1531 he ascended the Orinoco to the Meta confluence, that is, to the great plains extending from the inner slopes of the Andes to the Amazons basin. Gonzalo Pizarro, brother of the founder of Lima, also undertook a great journey in the quest of gold, but during his descent of the Rio Napo he found nothing more precious than the "cinnamon-tree," which was at first supposed to be as efficacious as the Ceylon plant, but which has since been neglected as worthless.

But the bark of a tree, however valuable, could scarcely suffice to sate the greed of a Pizarro. He accordingly continued his route beyond the cinnamon forest; but the morasses, the impenetrable masses of vegetation, the snags in the river, strewed his path with such difficulties that he was obliged to send forward a scout to explore the lower Napo and the mainstream of the Amazons. Unfortunately, he placed too much confidence in Orellana, who had been selected for this pioneer work, and who was himself eager, even at the price of treason, to acquire the glory, perhaps the profit also, of the discovery. He accordingly launched on the broad stream, drifting with the current from island to island, from bank to bank, all the way to the "Freshwater Sea" formed by the immense body of Amazonian waters spread over the Atlantic floods. For the first time the South American continent had been traversed from shore to shore, and, as it happened, the course followed nearly coincided with the equatorial line, not far from the zone where it acquires its greatest breadth.

This journey made by Orellana down the Amazons, and by his contemporaries regarded as prodigious, had several imitators amongst the pioneers and missionaries of those times. But the voyage up-stream was delayed for nearly another century, till 1638-9, when Captain Pedro Texeira ascended from Grão Para to the city of Quito with a flotilla of forty-seven canoes, containing 70 Portuguese soldiers, 1,200 Indian sailors and soldiers, and the like number of women and children.*

Gold-hunters descending from the upland valleys of the present Peru and Bolivia, also explored the waterpartings between the Amazons and La Plata

* M. J. de la Espada, *Viaje del Capitán Pedro Texeira Aguas arriba del Rio de las Amazonas.*

basins. Settlements were even formed in the Caravaya forests, which clothe certain parts of this dividing region. But such was the greed of the Spaniards that they murdered each other to prevent the coveted gold-mines from falling into other hands. Of two small bands of adventurers who came into collision in the mining district, not more than three persons escaped from the massacre.* Solitude was thus restored to these regions, where millions might live in comfort, and even now, after an interval of three hundred years, lands have to be again discovered which were visited by the first conquerors, and by them connected with the flourishing cities on the seaboard.†

A similar fate overtook the numerous missions founded by the Franciscans, the Dominicans, and especially the Jesuits, who grouped together the savage populations for the purpose of instructing them in the simpler crafts of European society, at the same time teaching them to recite the phrases translated from the catechism and the Latin text of the prayers and responses. Doubtless the missionaries were not all attracted to these difficult regions inhabited by formidable Indian tribes through zeal for the faith and the desire to evangelise the natives. A certain number of them came to reduce their folds to the condition of slaves; nor did they yield to the leaders of military expeditions in greed for worldly things.

But, on the whole, they were far superior to these adventurers in intellectual and moral worth, and to them we are indebted for some valuable itineraries, amongst others those made by Samuel Fritz in various parts of the Upper Amazons basin. The *Lettres Edifiantes*, in which their reports are collected, contain geographical and ethnological documents of the highest interest. Nevertheless there is scarcely an Indian village founded by these missionaries in the wilderness that has survived to our days. In the struggle for existence that raged amongst the surrounding populations, the wild tribes, being of bolder and more independent spirit, proved to be by far the stronger of the two elements. The groups of neophytes, having too rapidly changed their habits, and being still in an unstable or transitional stage of culture, yielded in far larger numbers to the ravages of European epidemics. Nation after nation was seen to disappear

* Clements Markham, *Expeditions into the Valley of the Amazons*, Hakluyt Society.

† Chronological order of the chief itineraries in South America during the first century of discoveries:—

Columbus	1498-1504	Cesar	1535
Niño, Guerra	1499	Almagra	1535
Hojeda, Amerigo Vespucci	1499-1501	Tómas de Berlanga	1535
Bastidas, Juan de la Cosa	1500	Ayolas	1536
Pinzon	1500	Quesada	1537
Diego de Lepe	1500	Belalcazar	1537
Alvarez Cabral	1500	Fredemann	1537
De Gonneville	1504	Badillo	1539
Diaz de Solis	1509	Valdivia	1540
Magellan	1520	Gonzalo Pizarro	1540
Andagoya	1522	Orellana	1540
Francisco Pizarro	1524-1540	Camargo	1540
Sebastian Cabot	1528	Irala	1544
Alfinger	1530	Sarmiento	1579
Diego de Ordaz	1531	Sebald de Wert	1598
Heredia	1533	Juan de Sosa	1609

before these maladies, melting away like mounds of snow in the sun. Then, when it came to the issue of war, the civilised tribes, being less daring, less inured to hardships, less confident in themselves, assumed a passive attitude, awaiting the orders of their new chiefs, without daring to take the initiative in resisting the attacks of their enemies. Thus it came about that districts densely peopled by peaceful communities again became a wilderness; hundreds and

Fig. 4.—Chief Routes of the Spanish Conquerors in South America.
Scale 1 : 65,000,000.

hundreds of tribes have left nothing but their name more or less accurately transmitted to posterity.

In the war of extermination waged by Brazil and the Argentine Republic against Paraguay, it was seen how the docile populations descended from those of the old Jesuit missions allowed themselves to be stupidly butchered by the half-castes of the Brazilian plateaux. Numerous villages founded in the first days of the conquest have disappeared, and beaten tracks hundreds of years old are now

overgrown with tall herbage and trees. The work of discovery instead of progressing continued for a long time to recede, so that the children began to doubt or to forget what their fathers had done; certain formerly well-known districts fell into complete oblivion.

During the long colonial period, journeys deviating from the frequented highways occurred only at long intervals. On the other hand, even the most successful expeditions served but little to increase the general knowledge of the land, for the jealous Spanish and Portuguese Governments sought to reserve for their own use the acquired results, keeping many precious documents in their secret archives, where they became worm-eaten past recovery.

The navigators of all nations continued the systematic survey of the coastlands, while the interior of the continent still remained wrapped in a dense cloud of ignorance. The detailed reports, accompanied by maps, which the officials were required to forward to the Council of the Indies on every province of the vast colonial domain, reports which are now of such value to students, were never published, and remained neglected by their custodians. Thus, at the time of the union of the two kingdoms, a joint Hispano-Portuguese expedition was made in 1638 up the Amazons between Para and Quito. But the Spanish Government, which had allowed the monk Acuña to write an account of the voyage, hastened to confiscate the book as soon as the Portuguese had recovered their independence. It feared that this work, the first that gave a detailed description of the great river, might be of service to some enemy.*

The epoch of scientific exploration began with the researches of Feuillée, a priest and astronomer, who, in 1707-12, made the circumnavigation of the southern shores of America in order to determine the exact position of a few points on the seaboard. But the modern geographical history of the continent may be said to date from the time when Bouguer, Godin, La Condamine, and Ulloa undertook the measurement of an arc of the meridian of about three degrees between the two parallel chains of Ecuador.

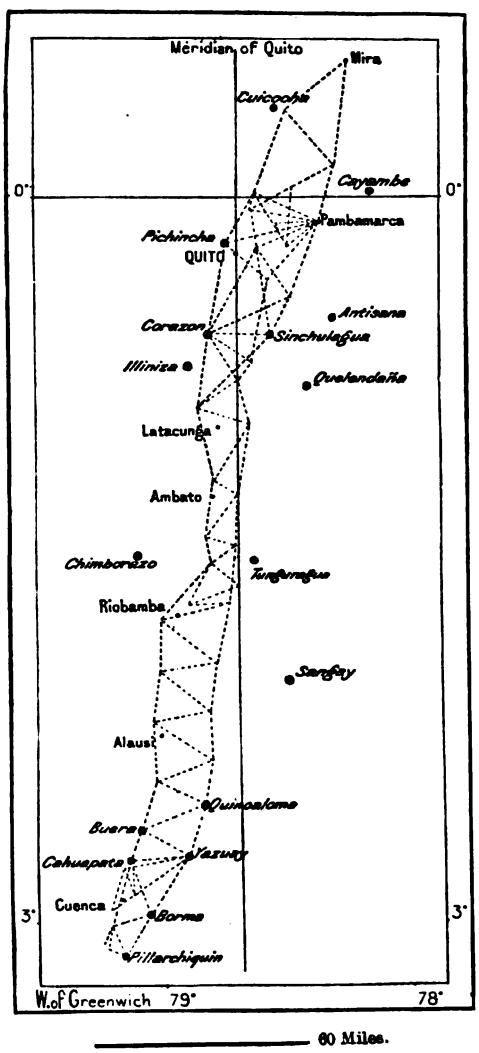
Over a century and a half has passed since the memorable year 1736, when the learned geometricians landed at Guayaquil, and made their way to the group of mountains which they had to measure, and which was at that time regarded as the culminating point of the globe. Many were the difficulties which they had to overcome, in an almost desert region, destitute of communications, furrowed by tremendous ravines, exposed to frequent earthquakes, covered lower down by almost impenetrable forests, higher up by rocks and snows. Hence the work, although steadily prosecuted, lasted six years; but it was of supreme importance, not only for the study of South America, but also for that of the whole world, and for determining the exact shape of the planet.

It is a remarkable fact, attesting the extreme care with which the scientific commission carried out its labours, that the positions assigned by it to the cities of the plateau and to the surrounding mountains were far more correct than those

* Acuña, *Nuevo Descubrimiento del gran Rio de las Amazonas*; C. R. Markham, *Expeditions into the Valley of the Amazons*, Hakluyt Society.

obtained sixty years afterwards by the great Humboldt when determining certain astronomic points in Ecuador. All the cartographic documents prepared during the course of the present century down to recent years had taken for their base Humboldt's observations of latitude and longitude, with the result that the section of the northern Andes between Bogota and Cuzco was shifted much too far westwards. In some places, notably between Guayaquil and the inland city of Alausi, the error was as much as 20 geographical miles.* Hence all the lines on the map had to be altered, so as to correspond with the old network traced by Bouguer and his associates. On his return La Condamine, descending the course of the Amazons, prepared the first chart of the river based on astronomic observations.

Fig. 5.—Determination of the Meridian of Quito.
Scale 1 : 3,500,000.



The Spanish Government had departed from its traditional policy in allowing the French geodesians to establish themselves in its American colonies. Over fifty years afterwards it made a like concession in favour of Alexander von Humboldt and his companion, Aimé Bonpland, who were permitted to visit its Transatlantic territories without any restriction. Landing in 1799 at Cumana, the two travellers traversed Venezuela; placed beyond doubt the remarkable bifurcation of the Orinoco already well known to the missionaries and local traders, but at times questioned by ignorant writers of the Old World; visited the Bogota plateau, the upper Magdalena basin, Quito, and its lines of volcanoes.

Humboldt tried to scale Chimborazo, which he believed to be pre-eminently the giant amongst the great mountains of the globe; although he failed to reach the summit, he reached a higher point on its slopes than any other previous climber. He never completed the description of his five years' travels in the "equinoxial regions." Nevertheless, his studies, embracing all phenomena of planetary life, as well as the discussion of all problems associated with them, became a veritable guide and *vade-mecum* for

* Theodor Wolf, *Verhandlungen der Gesellschaft für Erdkunde zu Berlin*, Nos. 9 and 10, 1891.

a large number of inquirers who entered either as disciples or rivals on the same career of scientific exploration.

Humboldt's journey was thus not only of capital importance for the history of Spanish America, but it must also be considered as the event which has given the most powerful impulse to the comprehensive study of the great terrestrial organism. Humboldt has even been called, though with some exaggeration, the "founder" of meteorological geography, of pelagic science, and of geographic botany. He devoted half a century to an orderly digest of the materials collected during his expedition.

Since this pioneer, legions of naturalists or men of leisure have traversed the various regions of South America, and hundreds of them have left their mark on the history of the discovery. By their itineraries they have modified the relative positions of many places wrongly laid down on the maps, and by their observations they have contributed in various degrees to a better knowledge of the country and its inhabitants. Thus Von Eschwege and, after him, Maximilian von Wied, Auguste de Saint-Hilaire, and, in a more complete and thorough manner, Spix and Martius explored in various directions the interior of Brazil and the Amazonian lands, some as geologists, others as botanists or anthropologists.

Pentland sojourned on the elevated Bolivian plateaux, and measured the encircling giants, to which, however, he wrongly assigned the first rank amongst the loftiest summits of America. D'Orbigny, Castelnau, and Marcoy devoted themselves especially to the geography of the central regions between the La Plata and Amazons basins; and while they were plodding patiently through the forests, heading or drifting with the stream, Darwin was making the famous voyage round the continental periphery where he collected the materials which, combined with the observations of Wallace and Bates on the banks of the Amazons and its affluents, were destined to help in definitely establishing the theory of the *Origin of Species*. It was through the exuberant life of the South American world, through the study of its plants and animals, that Darwin, Wallace, and Bates ushered in the order of research which has renovated science.

Each of the several South American regions had its special explorers, who contributed to determine its relief, to reveal its natural resources, and throw light on the character of its inhabitants. Thus the island of Trinidad has been described by Wells, Sawkins, De Verteuil and Kingsley. Codazzi, Myers, Sachs, Ernst, Sievers, Chaffanjon have distinguished themselves by their travels in Venezuela and neighbouring lands. Colombia has been explored in every direction by Raulin, Boussingault, Ancizar, Acosta, Karsten, Stübel, Reiss, Saffray, André, Steinheil, Hettner, and Vergara. Wolf, Rémy, Whymper, and De la Espada have studied Ecuador in its relief, its physical features, and natural history. Peru, one of the best-known regions of South America, has been traversed in all directions by Poeppig, Tschudi, Rivero, Bollaert, Angrand, Markham, Wiener, Paz Soldan, Raimondi, Simons. The Bolivian tracks have been followed by Weddell, Orton, Minchin, Reck, Guillaume. Domeyko, Philippi, Gay initiated the exploration of Chili, which has since been continued by numerous geologists and engineers.

Cox, Moreno, Musters, Rogers, Moyano, Lista have ventured into the wilds of Patagonia and Tierra del Fuego. Martin de Moussy, Burmeister, Page, Crevaux, Thuar, De Brettes, and many others have led the way for settlers, miners, and traders in the Argentine lands. In the vast Brazilian domain Agassiz and Hart have ascended the Amazons in the wake of numerous predecessors. Halfeld has prepared the map of the San Francisco basin; Wells has studied the fluvial valleys inclining towards São Luis de Maranhao; Von den Steinen has ascended the Xingu; Ehrenreich has resided amongst the Carib Indians of the Amazonian woodlands; Church has surveyed the Madeira and its rapids. The exploration of the Purus, begun by Chandless, has been completed by Labre, who has connected the various routes of this river and its affluents with the course of the Madre de Dios and of the Mamoré. Sosa's exploration of the Içа (Putumayo) between Ecuador and Amazonia has been resumed after a lapse of two hundred and fifty years by Crevaux and Simson. Lastly, in the Guianas, where Schomburgk had opened the way to the interior, and where Appun and Brown had made important geological and natural history studies, Crevaux and Coudreau have advanced across the mountains and descended by various routes towards the banks of the Amazons. Every year numerous travellers continue the work of discovery, and their steps are followed by miners and railway builders.

Nevertheless there still remain vast territories in South America which have never yet been traversed and described by any white man; notably in the boundless forest region of the Amazons valley there are compact spaces, 20,000 square miles in extent, which still await the explorer. In these districts the course of the rivers has been traced at haphazard or on hearsay reports. No part of the continent has been figured with an accuracy comparable to that of the charts of West Europe. Even the countries which have made the greatest progress in this respect, the Colombian plateau, Chili, West Peru, the Argentine Republic, possess no thorough surveys. The best charts are naturally those of the seaboard frequented by the mariners of all nations, and those of the agricultural and mining regions in the interior, where the populations are already grouped in numerous towns and cities.

II.

The triangular mass of South America forms two distinct natural divisions, differing greatly in their form, relief, climate, products, inhabitants, and historic evolution. In the western section of the continent are comprised the mountain ranges of varying size and altitude, and of comparatively recent origin, which follow the coastline of the Caribbean and Pacific waters between the two extreme points of Trinidad and Staten Island, and which have a total development of no less than 5,900 miles. The eastern section, less in absolute length, but of far greater superficial extent, embraces the vast plains of the interior, together with the irregular mass of uplands which skirt the Atlantic as far south as the La Plata estuary, and which are of great geological age.

The political divisions of the continent correspond in a general way with

these natural features. Thus the three republics of the ancient province of Colombia (Venezuela, Colombia, and Ecuador), Peru, Bolivia, and Chili, all belong to the western (Andes) section; while the Guianas, Brazil, and the Argentine States form part of the eastern section, sloping towards the Atlantic. The limits, however, of the respective physical and political divisions are far from coinciding with any approach to accuracy. With the exception of Chili, comprised entirely within the Pacific slope, all the Andean states encroach considerably on the inland plains. The whole of the Orinoco basin, although lying in the Atlantic area of drainage, is, nevertheless, comprised within the two Andean republics of Venezuela and Colombia. But these frontiers, laid down by diplomatists, run for nearly their entire length through regions inhabited only by the aborigines and a few half-castes. Even in the eyes of the geographer their importance is but slight.

The Andes Orographic System.

The characteristic feature of South America, as compared with other continents, is the remarkable regularity of the orographic system which forms its backbone. From east Venezuela to the Strait of Magellan the line of the Andes nowhere presents a single break. Throughout its vast extent, however, it ramifies into two or more foldings, for the most part parallel, and enclosing extensive elevated and level tablelands. The system develops two main curves—the first, intersected by the equator, turns its convex side towards the Pacific, and projects its most advanced point at the headland of Punta Pariña in north Peru; the second, sweeping round to the south-east and south, has the centre of its concave side at the point where now stands the city of Arica.

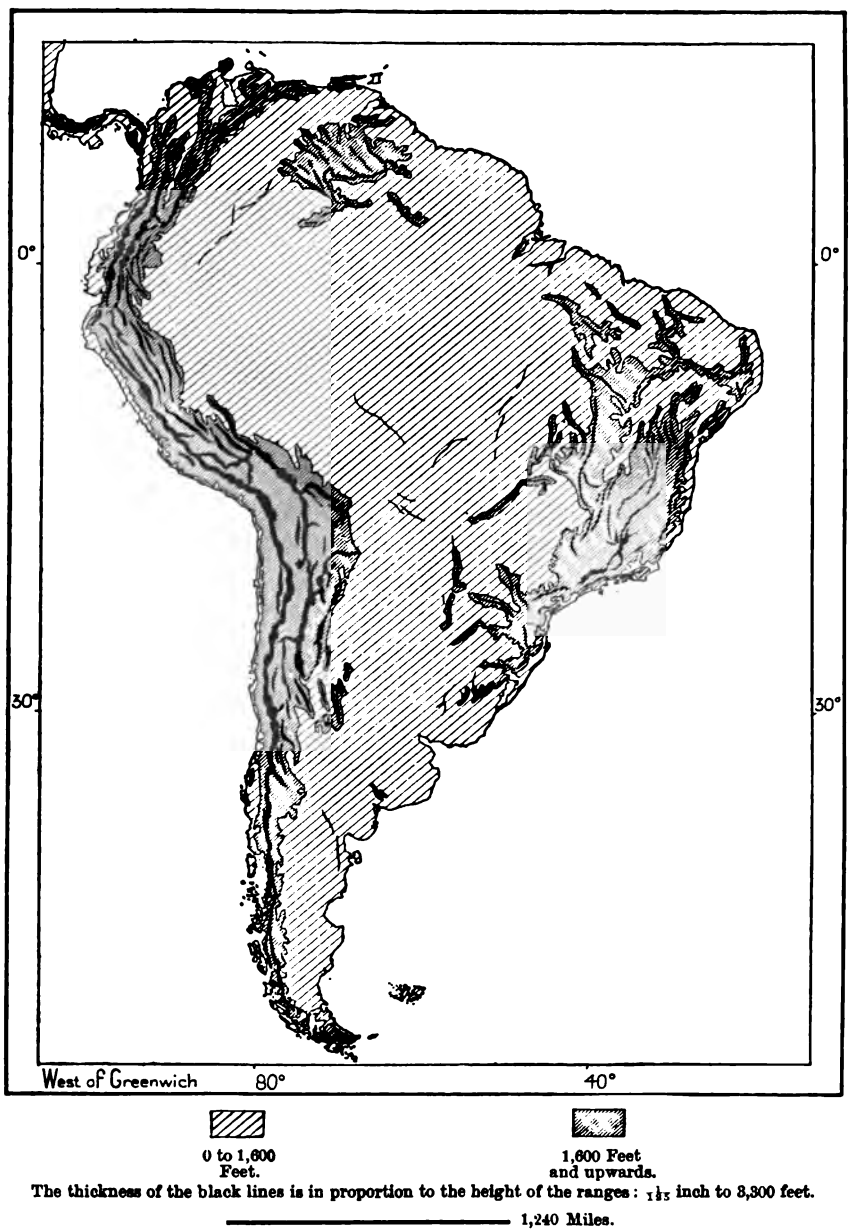
South of Arica the system runs parallel with the coast nearly in a straight line from north to south. But towards the extremity of the continent it develops a second convex curvature, traced as if with the compass, which is continued seawards by a submarine ridge connecting Tierra del Fuego with the archipelago of South Georgia.

Everywhere the Andes hug the coastline, and in many places, as at Guayra, in Venezuela, the escarpments plunge sheer into the sea, where they are continued, without any intermediate terraces, down to the abysses of the oceanic cavities. No real plains occur between the foot of the mountains and the seashore, except in the northern provinces of Colombia, where, thanks to the abundant rainfall, the eroded rocks have been transformed to broad alluvial flats. On the Pacific side, where the rainfall is much lighter, there are scarcely any plains, but only a series of terraced lands between the mountains and the sea. Here also the marine waters deepen rapidly, abysses of 1,000 fathoms occurring normally within 120 miles of the coast. Thus the submerged roots of the Andes present an aspect analogous to that of the upraised slopes, except that their incline is considerably less abrupt. Evidently the coast ranges and the coastline are due to the same cosmic phenomenon.

But, however regular it may be in its main outlines, the Andes orographic system presents great differences in its several sections, which vary in breadth and altitude

as well as in the number of their parallel or divergent chains. The great central plateau, which may be called the heart of the Andes, is one of those where the ramifications are most numerous; but these ramifications are mere ridges compared with

Fig. 6.—Outlines of the Andes and of the Eastern Highlands.
Scale 1 : 56,000,000.



the huge pediment of the elevated tablelands, which have a mean altitude of from 14,000 to 16,000 feet for a space of over 80,000 square miles.

From the Pacific shores eastwards to the plains watered by the Amazon and La Plata affluents, the uplands of the Bolivian Andes have a breadth of from 460

to 500 miles in a straight line. In this highland region are found, if not the culminating point of the South American continent, at least the groups of peaks and domes which have the greatest mean altitude. Here rise Illampu and Illimani, both of which exceed 21,000 feet. These giants indicate with sufficient accuracy the central point of the Andean system, and the central points of the northern and southern sections are similarly indicated by the other loftiest summits of America—in Ecuador, Chimborazo, long supposed to be the highest mountain in the world; and in the Argentino-Chilian Andes, Aconcagua, which at any rate is the culminating peak of the New World. Besides these extreme summits, dozens of other crests in Venezuela, in Colombia, and in all the other Pacific states exceed 13,000 feet, an altitude far above the zone of arborescent vegetation.

Snows and Glaciers.

The snow-line varies with the latitude; but, as Whymper asks, what is this line? Certain completely isolated mountains of the Ecuadorian Andes have no permanent snows at 16,500 feet; others, more exposed to the moist winds and less subject to rapid evaporation, remain white throughout the year at an altitude exceeding 14,450 feet. Speaking broadly, the snows descend lower and are more abundant in the eastern highlands facing the trade winds than on the western ranges; for each summit also the rule holds good, the eastern being more snowy than the western slope.*

In the equatorial Andes from the Nevada de Santa Marta to the Bolivian uplands the limit of perpetual snows may, in a general way, be said to oscillate between 14,750 and 16,400 feet. By a remarkable contrast, the explanation of which must be sought in the varying proportions of moisture brought by the prevailing winds, the snows descend as a rule considerably lower on the domes and cones of Ecuador, that is, on the equinoxial line itself, than on the Bolivian and Argentine mountains, under the southern tropical line, or even within the temperate zone. The Sierra de Zenta, which rises to 16,400 feet under the tropic of Capricorn, is never snow-clad in summer, and rarely in winter.

In the Bolivian Andes Pentland tells us that no perennial snows are met on the western slopes lower than 18,370 feet. The flakes are evaporated as fast as they fall without passing to the liquid state to form running waters. The vapoury cloudlets that are seen during the heat of the day rising above the summit of the mountains are the snows returning in this form to the atmosphere.† But south of this zone of dry winds the line of persistent snows is rapidly lowered by the abundant moisture precipitated by the clouds. In the Magellanic archipelago and in Tierra del Fuego the lower limit stands at about 4,900 feet.

Glaciers have been seen in all the Cordilleras in the tropics exceeding 13,000 feet, as, for instance, on the Nevada de Santa Marta, the Sierra de Cocui and the Mesa de Herveo, in Colombia. Humboldt having seen none in the Ecuadorian Andes, either because of the foul weather or because they were covered in some

* Edward Whymper, *Travels amongst the Great Andes of the Equator.*

† Martin de Moussy, *Confédération Argentine.*

places by shingle, in others by fresh-fallen snow, denied their existence in these tropical Alpine regions. But he was mistaken, as the observations of Whymper have clearly shown. Certain great igneous cones in the Quito district have their circular snowfields fringed with as many as fifteen glaciers, scored by crevasses, furnished with lateral and frontal moraines like those of the European Alps.

In the Bolivian Andes, Illimani has also its frozen rivers, and in Chili the rapid lowering of the snow-lines corresponds with the appearance of numerous glaciers. South of the 35th parallel every upland coomb receives its crystal stream descending lower and lower towards sea-level. In the inner channels of the Magellanic archipelago, a glacier may be seen issuing from every valley on the mainland. Towards the southernmost point of the continent the crystalline masses at last reach the seashore, where they break away in small blocks which are borne northwards by the marine current.

Volcanoes.

The Andes belong to those orographic systems in which numerous volcanoes have cropped out through rocks of a different formation. Nevertheless, the subterranean fires have not found "safety valves" along the entire length of the chain between the Caribbean Sea and the Strait of Magellan. On the mainland the craters are grouped in three great clusters, those of Colombia and Ecuador in the north, of Bolivia in the centre, and of southern Chili in the south. At least sixty still active cones rise above the Andean axis, and hundreds of others now quiescent formerly shared in the work of eruption.

The line of igneous crests is even continued beyond the Fuegian archipelago, away to the Antarctic lands, where navigators have seen the clouds aglow with the flames issuing from burning mountains. West of the South American coast, and under the same latitude as the volcanoes of Ecuador, the Galapagos Islands form a short chain surging, as it were, above abysmal waters some 1,500 fathoms deep.

But east of the Andes along the prolonged axis of the Antilles, the South American continent has not a single eruptive cone. Here the igneous disturbances appear to be arrested at Trinidad and the opposite coast of Venezuela, where the oil wells and mud volcanoes may perhaps stand in some relation with the underground forces.

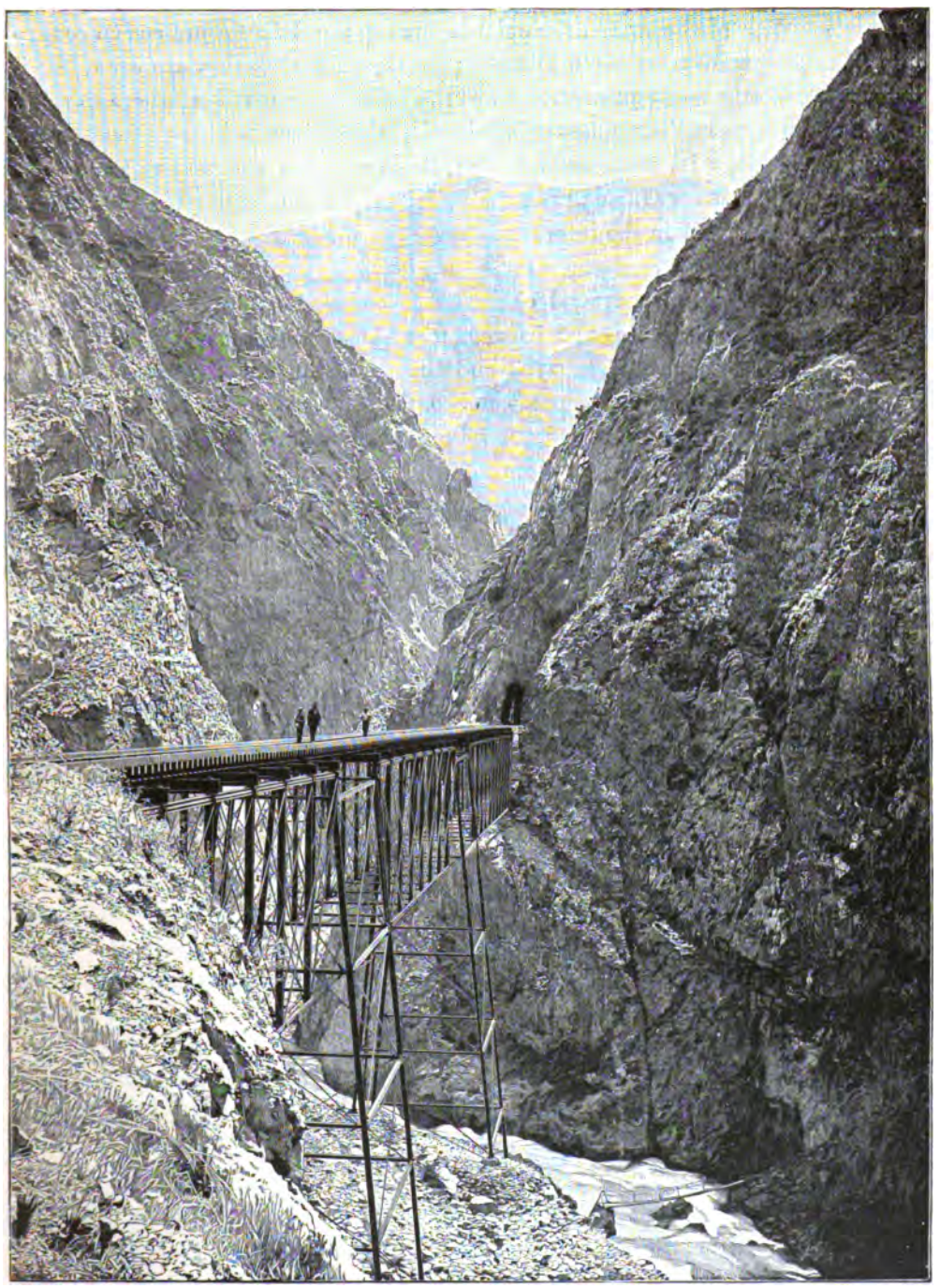
In this respect the contrast is certainly very marked between the two sections of the continent, the Andean region and that of the Guianas and Brazil. In the former the planetary life manifests itself with the greater energy, and this section is also the younger of the two. Formed in more recent geological epochs, it has not yet completed its upward movement. The several ranges, however, appear to have been upheaved in an extremely irregular manner, and some of the loftiest crests are amongst those whose origin dates from comparatively modern ages.

The Eastern Orographic System.

Taken as a whole, the Andine crests rose above the ocean during geological periods later than those that witnessed the birth of the eastern uplands in the

Guianas and Brazil. These consist chiefly of crystalline and archaic rocks, sandstones, and schists, which are overlain to a vast extent by mesozoic and, especially,

Fig. 7.— Andes Scenery. View taken at the Chaupichaca Bridge, Lima—La Oroya Railway



cretaceous formations. In this respect the same contrast has been observed in the southern as in the northern continent. In the epoch of their appearance, as well

as in the altitude, general trend, and relative position, the Brazilian *serras* resemble the Alleghanies, while the Andes correspond to the Rocky Mountains, of which they were formerly regarded as the southern continuation.

Carved into a number of fragments by the great streams descending from the eastern slope of the Andes, the uplands facing the Atlantic present no continuity in the direction from north to south; in some districts they are even distributed without any apparent order. Thus the hilly Parima region, where so many gold-hunters hoped at one time to find the city of El Dorado with all its fabulous treasures, develops its main axis in the direction from the north-west to the south-east. The other Guiana ranges also follow, for the most part, in the same direction, as indicated in the intermediate valleys watered by the affluents of the Orinoco.

South of the Amazons several chains of low elevation have the same trend, running parallel with the coast between the Amazons estuary and Cape São Roque. But west of the Parnahyba and thence to the Rio Grande do Sul, the ranges are disposed mainly north-east and south-west, in the same direction as the seaboard. The more elevated and precipitous ranges are almost completely separated from the inland plateaux by the two valleys of the São Francisco and Parana, which are inclined in opposite directions, and which communicate across a low parting-line about the region of their sources. This double valley, which in reality forms only a single depression, is also roughly parallel with the Brazilian coast, whose sinuosities it follows at a mean distance of 300 miles, and for a total length of over 1,250 miles.

The loftiest summits of the Brazilian uplands lie under the same latitude as that part of the Andes where is situated, if not the culminating point, at least the most imposing group of the whole system. Like the Andes also, whose precipitous slopes face the Pacific, the Brazilian highlands, and especially the Serra do Mar, turn their steep escarpments towards the deep waters of the Atlantic.

Upheaval and Subsidence.

The eastern and western seaboards differ, to a marked extent, in the changes of level that have taken place along their respective coastlines. Indications of an upheaval of the land, or else of a subsidence of the sea, are much more numerous, and give evidence of far more extensive oscillations on the Pacific than on the Atlantic side. In fact, the opposite movement has been at work along the east coast, where the encroachments of the ocean, either by actual upheaval or by a sinking of the land, are still going on to an extent which is probably unequalled in any other part of the world.

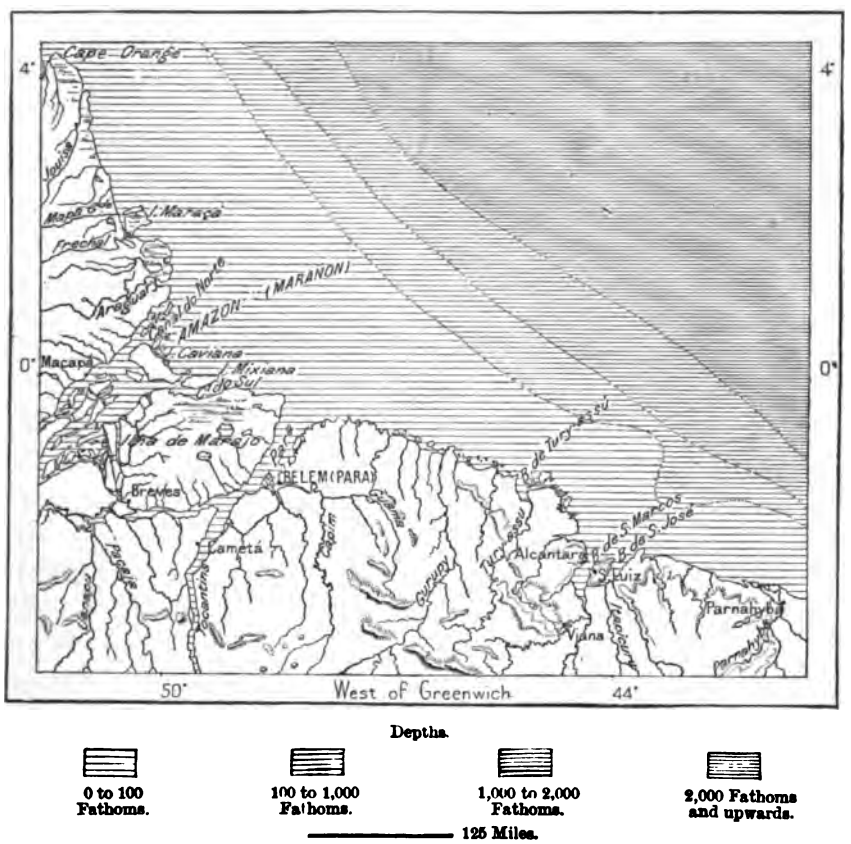
On the shores of Chili and of the adjacent island of Chiloe, as was already observed by Pœppig over fifty years ago, there are everywhere visible old marine beaches of perfectly regular formation, and still covered with shells belonging to species of the present epoch. The studies of Darwin, Philippi, and Domeyko leave no doubt on this point. At the issue of all the valleys where occur lateral terraces, the remains of an ancient plain eroded by the running waters, the distinction has

been clearly established between the two types of terraces, which otherwise somewhat closely resemble each other in their general aspect.

In many places the beaches left high and dry by the retreating waters or by the upraised coast take the form of flights of steps, the highest of which stands over 1,000 feet above the present sea-level. Under the tropic of Capricorn the mountain range projecting beyond the normal shore-line, between the bays of Mejillones and Antofagasta, has been subjected to a still more violent thrust. At a height of 1,450 feet on the slopes of the Cerro Gordo are seen shell-mounds

Fig. 8.—Region of Oceanic Encroachments about the Amazons Estuary.

Scale 1 : 11,400,000.



consisting of quite contemporary species, but in certain places associated with a cardium which is now found no longer in the Pacific, but only on the coasts of Africa. This extraordinary fact shows that at the epoch when the Cerro Gordo was submerged the distinctive Atlantic fauna was still represented on the Bolivian seaboard, thanks to one or more now obliterated marine channels.*

The depressions noticed on the Brazilian coasts extend over a vast space, comprising the entire margin of the Amazons estuary, and reaching eastwards as far as the Itapicuru and the Parnahyba. No other river brings down an equal quantity

* R. A. Philippi, *Die tertiären und quartären Versteinerungen Chile's.*

of alluvial matter, which represents at the lowest estimate a solid mass 45 square miles in superficial area, with a thickness of over 30 feet. The Mississippi, which discharges four or five times less mud and water, has nevertheless built up in the open sea an alluvial delta terminating in a system of mouths spread out in the marine waters like a branching mass of coral.

At the mouth of the Amazons the Atlantic has, on the contrary, opened a spacious gulf, and from century to century penetrates farther into the interior of the fluvial valley. The sediment washed down with the stream is not deposited in the gulf, which would else be rapidly filled up; but it is carried away by the marine current crossing the Atlantic from the Gulf of Guinea to the West Indies, and thus gets lost in the depths of the sea, or else is distributed along the slimy margin of the Guiana seaboard.

The work of erosion, aided doubtless by a general subsidence of the marine bed, progresses at such a rapid rate that observers have been able to record many indications of its action during the brief period of the last half-century. The shores retreat, so to say, and become indented by new inlets, while the shallow ramifying creeks are transformed to deep channels; the islands and islets slowly melt away until they disappear altogether; lighthouses erected at some distance from the shore have had to be replaced by others built still farther inland. Owing to this incessant encroachment of the sea on the mainland, the Amazons is estimated to have lost from 400 to 500 miles of its former length, and the old beach would now appear to be indicated by the 100-fathoms line.

The Parnahyba, the Itapicuru and the Tury-assu, former affluents of the mainstream, now reach the sea in independent channels; the Tocantins, also, which at one time flowed to the Amazons, is now connected with it only by a network of lateral branches, which shift their beds with the periodical floods of the tributary streams. Thus the invasions of the ocean are decomposing the great fluvial basin into secondary systems. Owing to these different oscillations of the seaboard—subsidence on the Atlantic, upheaval on the Pacific side—the whole continent may in a sense be said to have been displaced westwards: it has moved farther from Europe and nearer to Australia.

III.

The very nature of the soil and the continental relief are, no less than the vegetation itself, to a large extent the result of the climate, as determined by the prevailing winds, by the rainfall and the running waters fed by it. Thus the Orinoco has cut itself a passage through the northern coast range and the Guiana mountains. In the same way the Amazons has swept away the obstructions to its course, dividing into two sections the whole system of the eastern uplands. In the central parts of the continent, also, the waters, diverging in two opposite directions, have removed all the transverse ridges formerly connecting the Cordilleras with the Brazilian highlands.

To the effects of the climate must also be attributed the gradual contraction and lowering of the Cordilleras themselves in that part of the system exposed to

the action of the alternating north-east and south-east trade winds, both charged with abundant moisture, by which the rocks have been ravined and their detritus swept away. The lateral ridges formerly disposed parallel with the main range have disappeared; the geological strata, whose debris are still seen north and south of the breach, have been destroyed and replaced by drift of more recent origin, here and there heaped up around isolated knolls of the primitive formations. Should the work of erosion continue, the time may be foreseen when the Cordilleras will be completely pierced, when the Amazonian plains will be separated only by a sill of low elevation from the Gulf of Guayaquil.

But while the Andes have in this region been reduced to a narrow stem by the destructive action of the rains, in Bolivia they have, on the contrary, been maintained in their full amplitude, thanks to the shifting winds, which are here deflected some to the north, some to the south, so that but little rain or snow falls along their normal track. Farther south a fresh contrast corresponds with a fresh change in the course of the aërial currents. Here the system is reduced to a single range flanked at most with a few small parallel ridges; it is intersected by deep gorges and passes cut through the heart of the rocks, and is at last entirely broken by the Strait of Magellan. Water was the agent by which the highlands have thus been carved, hollowed out, and in places quite eaten away by the copious rains accompanying the oceanic winds.

At a former time, when the coast valleys were still filled with ice, glaciers also contributed to modify the seaboard by preventing the deposit of alluvial matter, and carrying seawards the detritus of all kinds.

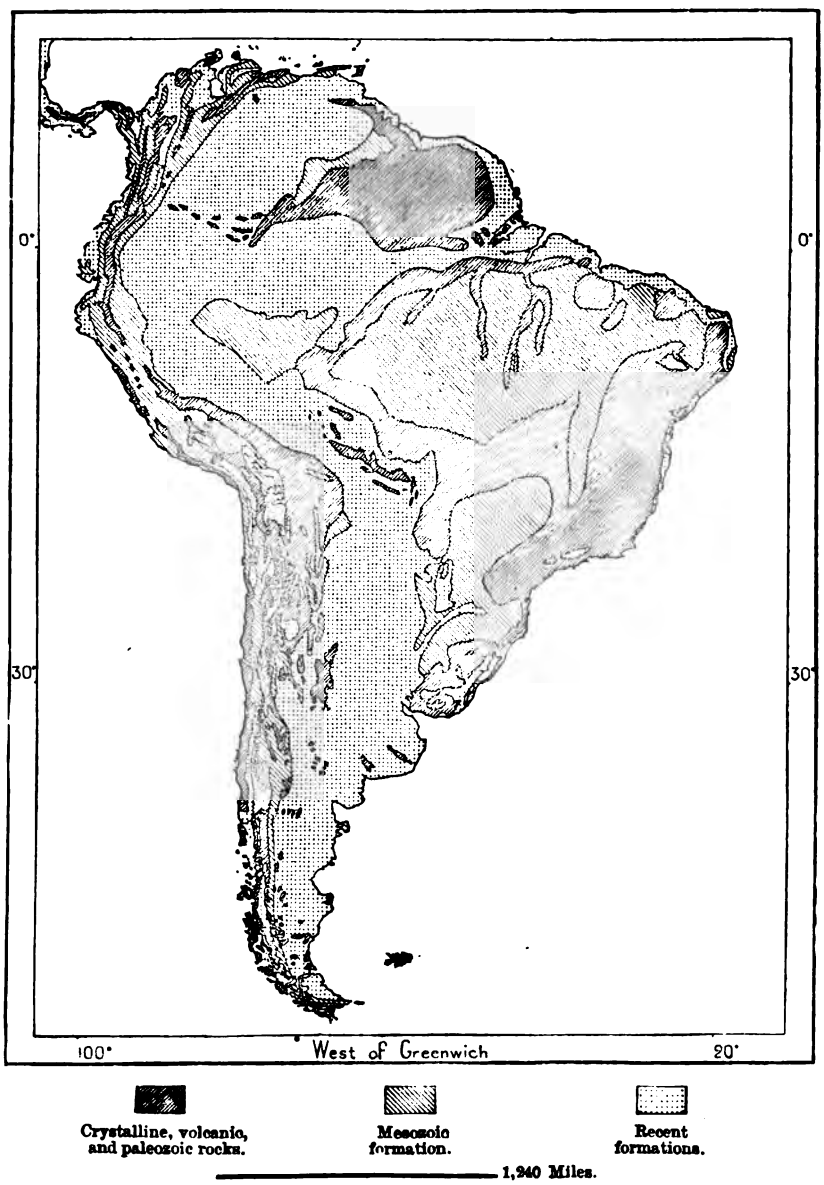
Climate.

Taken as a whole, the South American continent enjoys a far more moderate climate than the division of the globe on the opposite side of the Atlantic. Its superiority in this respect must be attributed to the difference in the form of the two continental masses. South America being much narrower, the moderating influence of the surrounding marine waters is more easily felt far inland. Moreover, the western continent is largely exposed to the action of the trade winds which sweep up the broad valleys of the Orinoco and Amazons. In Africa, on the contrary, the most elevated coast ranges are disposed along the shores of the Indian Ocean, and thus intercept the winds blowing from the rainy quarter. The northern section of this continent also lies to leeward of the huge mass of lands formed by Europe and the whole of Asia. Thus it happens that the north-east polar winds passing over Turkestan, Persia, and Syria arrive almost completely deprived of moisture, and under their dry breath the summer heats become oppressive.

In South America the line of greatest heat, which nearly coincides with the seaboard between the Gulf of Uraba and Cape São Roque, scarcely represents an average of more than 80° or 82° Fahr., whereas in Africa the corresponding isothermal traverses a zone where the normal temperature exceeds 86° Fahr., and where the heat is tempered by no sea breezes, as it is on the Colombian and Venezuelan coastlands.

On the other hand, the southern section of South America may be regarded as lying within a cold zone, where the thermometer falls to 41° or even 39° Fahr. on the plains, standing at a slight elevation above sea-level. On the coast ranges the temperature, falling with the altitude, soon reaches freezing point. In this

Fig. 9.—Main Geological Divisions of South America.
Scale 1 : 55,000,000.

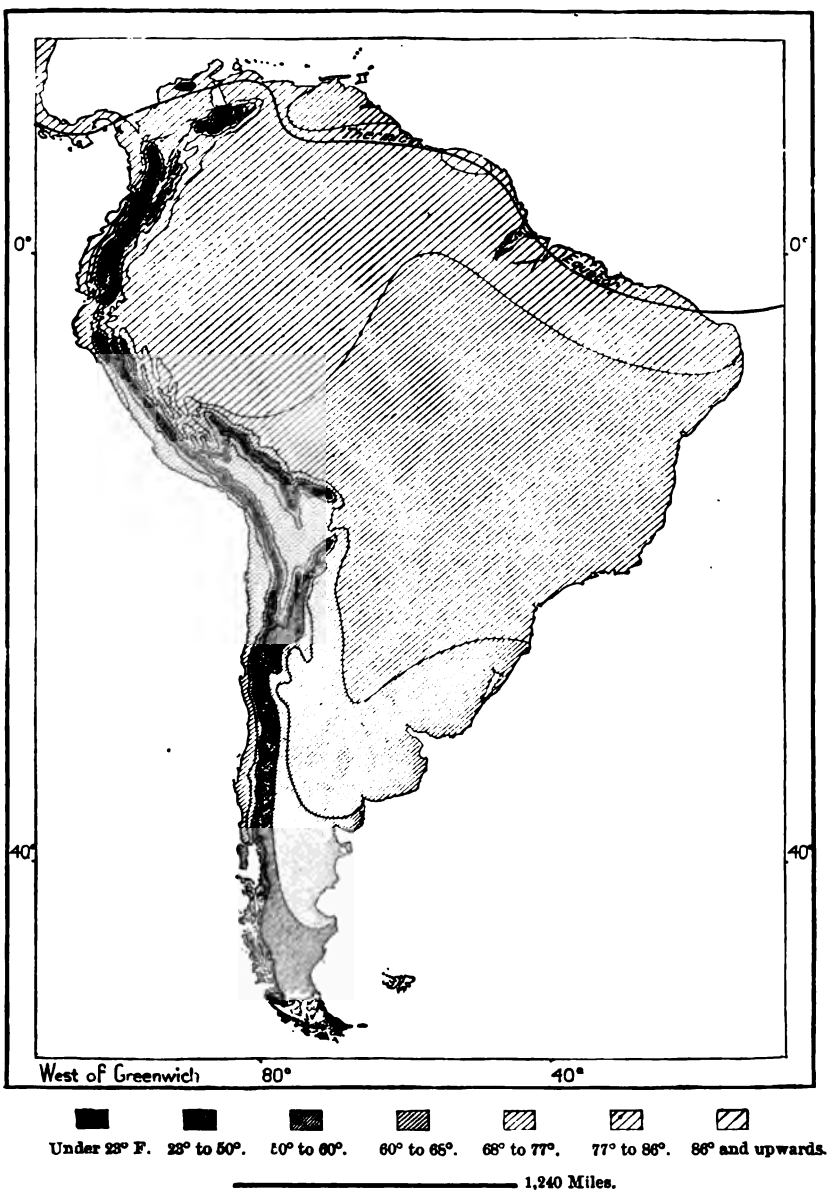


southern region the natural limit between the temperate and frigid zones is clearly indicated on the west side by the fjords indenting the Chilian seaboard. The sudden break in the uniformity of the coastline occurs a little north of 42° south latitude, at the Chacao passage separating the island of Chiloe from the mainland.

In the northern hemisphere the zone of fjords, representing the work of ancient glaciers, is shifted nearly 430 miles farther from the equator, that is, to 48° north latitude, where the Strait of Juan de Fuca gives access to the great fjord known

Fig. 10.—Isothermal Lines of South America.

Scale 1 : 55,000,000.



as Puget Sound. Thus South America, although its terminal point falls short of 56° south latitude, lies none the less, to some extent, well within the glacial zone.

Another factor contributing not a little to the cooling of the South American continent is the marine current which sets from the Antarctic regions straight for Tierra del Fuego, and which continues its northerly course along the west

coast of the mainland. In this respect the northern division of the New World is privileged. Under the latitudes of California and Oregon, which correspond to the Chilian and Magellanic archipelagoes, the seaboard is washed, not by a cold

Fig. 11.—Distribution of Rainfall in South America.
Scale 1 : 55,000,000.

current, but by the relatively tepid waters setting across the Pacific eastwards from the China and Japan seas.

It may be inferred from numerous geological phenomena that, at a more or less remote epoch, the climate of the Andes was far more humid than at present.

Old lacustrine basins, dry watercourses, and other indications of extremely energetic water action occur precisely on the western slopes where the work at present accomplished by the moisture, under the form of dews and rare showers, is insignificant compared with that produced by the changes of temperature. Noteworthy especially are the deep *quebradas*, or narrow gorges, excavated to depths of from 300 to 600 feet in the escarpments of the Peruvian plateaux. One asks in amazement, what downpours could have scored such tremendous furrows in the live rock? They are certainly not the work of the few showers which fall every thirty or forty years, as if by a miracle, in this now almost rainless region.

The hypothesis of a formerly moist climate is confirmed by the facts drawn from the domain of natural history. Various plants flourishing on the Ecuador and north Peruvian uplands reappear in South Chili, but are completely absent from the intervening arid Bolivian tablelands. So also with certain species of animals, such as the *Cervus antisensis* of the Peruvian Andes, which has been described by D'Orbigny and Tschudi, and which appears to be identical with the guermul or *Cervus chilensis* of the southern Andes and Magellanic lands. It occurs nowhere in North Chili, and the question arises, how has its range been severed in two? How does it happen that the same plants also occupy two distinct domains, one cold, the other hot, while avoiding the intermediate temperate zone? The explanation is that rain and atmospheric moisture are a necessary element in the evolution of these organisms. So long as the Andean plateaux were sufficiently watered, plants and animals roamed freely over the region at present occupied by the Atacama desert and neighbouring heights. But when the rains failed, a solution of continuity was effected between the northern and southern biological areas. In the heart of the Atacama desert, where nothing now sprouts except a few almost leafless stalks, the miner's pick often turns up the roots of large trees which formerly grew in forests on the now arid steppe.*

To the increasing dryness of the climate is also due the fact that the great Bolivian lake, Titicaca, has ceased to form part of the Amazons system. Formerly it sent its overflow to the Beni affluent, but it is no longer able to cross the parting line, and the slowly subsiding waters have left vast spaces unflooded. What remains of the old inland sea is nearly fresh, doubtless because the isolation of the lacustrine basin dates from a comparatively recent geographical epoch.

Flora.

In the relative extent of its area under timber South America is surpassed by the Eastern Archipelago alone. Even Central Africa with its prodigious seas of verdure, which the Stanley expedition up the Aruwimi had so much difficulty in traversing, presents no such extensive space under continuous arboreal vegetation as the boundless woodlands of the Amazons basin and its affluents. These woodlands comprise also the whole of the Guiana seaboard, and are continued northwestwards by those of the Magdalena and Atrato valleys in Colombia.

With the exception of the interruptions caused by rocks, lakes, swamps, and

* Philippi; H. W. Bates, *Stanford's South America.*

rivers, the forest presents an unbroken surface in which human labour has hitherto made but a few isolated clearings. They are scarcely even traversed by any beaten tracks, except those made by the puma, tapir and peccary. Like the ocean, like the snowfields of the polar regions, the verdant seas covering tropical America seem to constitute a world apart, presenting an endless diversity of species, but of remarkable uniformity in its general aspect. The trees interlace their branches; trunks and foliage are bound together by the coils of the lianas, until the whole forms an inextricable tangle of vegetation, vibrating in long undulations with every breath of wind.

These continuous woodlands, which branch off southwards up the valleys of the Amazons affluents, are continued across the inland plateaux of Brazil by a less densely timbered region, in which the trees stand out with more distinct individuality, but which none the less constitutes an immense expanse of true forest, the *Matto Grosso*, or "Great Wood," as it is called by the Brazilians.

Still farther south follow the *catingas* and the *campos*, or "fields," that is, open spaces dotted over with araucaria thickets. These are succeeded in the southern parts of the La Plata basin by treeless plains, producing little but low plants, such as grasses and thistles. Here the arborescent vegetation is represented only by a few isolated trees, visible far and wide on the boundless plain. Such are the *pampas*, corresponding to the *llanos* north of the equator, that is, the open Venezuelan plains, everywhere encircled by the tropical forest zone. Less extensive than the pampas, the llanos are also less destitute of trees; in many places the heights, or even the simple rising grounds, are crowned with thickets or clumps of trees, resembling at a distance green islets in a shoreless sea. Here also the streams are lined with a fringe of leafy vegetation.

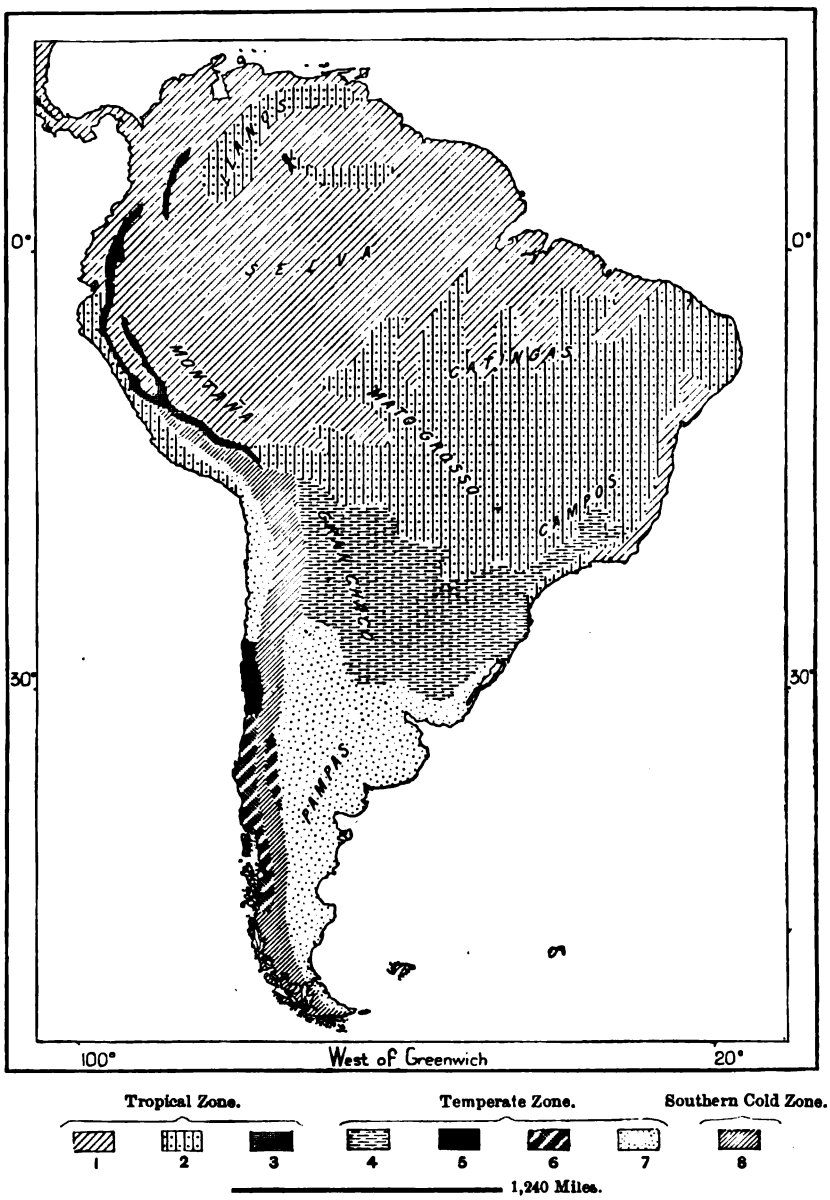
All these transitions from dense forests to more open woodlands, from groves and thickets to treeless savannas, correspond with the varying proportion of rainfall. The regions clothed by the Amazonian forests receive copious downpours nearly throughout the year, the dry season, as it is called, lasting less than three months. The absence of forest growths, as in the llanos, and in the districts of Guiana sheltered from the east winds by coast ranges, is due to the presence of a screen of mountains, by which the rain-bearing clouds are intercepted.

In Matto Grosso and the neighbouring provinces, where the dry season lasts more than three months, the moisture is insufficient to nourish an exuberant vegetation such as that of the Amazonian woodlands. It diminishes in the region of the Brazilian campos, and still more in the pampas of Argentina. Lastly, the few deserts of South America, also called "pampas," the sands of Tumbes and of Sechura in north Peru, the Pampa de Tamarugal, the Atacama desert in the territories recently annexed to Chili, all owe their lack of vegetation to the almost total absence of rain.

The southern extremity of the continent is too far removed from the Antarctic Pole for the temperature to destroy the forest vegetation. But the

same effect is produced by the altitude of the mountains. Numerous summits, and, in fact, all the Cordilleras taken as a whole, rise in the cold atmospheric regions above the forest zone. As a rule, the upper limit of this zone lies at

Fig. 12.—Drude's Main Botanical Divisions of South America.
Scale 1 : 57,000,000.



about 3,000 feet below the snow-line. Under the equator and in Bolivia forests still reach an elevation of 11,500 feet on the flanks of the mountains. But above them plants of low growth range right up to the edge of the snows, and even higher in those spaces where the snows have been cleared by the winds

or the solar heat. Boussingault found a saxifrage growing at a height of 15,770 feet on Chimborazo, while mosses and lichens have been gathered on the same mountain at altitudes of 16,500, 17,000, and even 17,350 feet.

On the slopes of the mountains and along the main ranges the different floras follow in succession one above the other—at their base tropical plants, higher up those of the temperate zone, and towards the summits an alpine or glacial vegetation. Thus the Andes and the other South American highlands contribute by their superimposed climates to the great variety of species characteristic of this continent. In Europe, where most of the ranges are disposed in the direction from east to west, the various vegetable forms spread freely in the same direction from one end of the continent to the other. But not so in South America, where the plants of the east are abruptly arrested by the barrier of the Cordilleras, while on the opposite side, even under the same latitude, other forms have been developed, analogous, but still distinct enough to constitute an independent flora.

Lastly, the oceanic archipelagoes of the Galapagos and Juan Fernandez are distinguished amongst all marine lands for the original character of their floras, forming in this respect little worlds apart.

By keeping in view the chief contrasts between the floras diversely intermingled at the points of transition from zone to zone, South America may be divided into eight great botanical domains, to which must be added the archipelagoes, as forming so many different provinces. The Falkland Islands, however, resemble Tierra del Fuego in their herbaceous and scrubby growths, and in the general aspect of their vegetation.

According to O. Drude* the eight divisions are as under:—

Tropical Zone.—1. Evergreen virgin forests; rains throughout the year, or for not less than nine months.

2. Forests and savannas intermingled; dry season of over three months.

3. Tropical flora of the uplands.

Temperate Zone.—4. Evergreen forests with palms and pines; summer rains from December to March.

5. Evergreen shrubs; few or no trees; no palms; winter rains.

6. Evergreen trees, with deciduous leaves; bush; pine forests; no palms; rains throughout the year.

7. Prairies, steppes, and deserts; great variations of temperature; slight rainfall.

Frigid Zone in the south and on the uplands.—8. Impoverished arborescent vegetation.

Thanks to its extremely diversified flora, South America has, during the last four centuries, given to the civilised world more plants useful for alimentary, medicinal, and industrial purposes than any other division of the globe. The potato, which has become the staple food of so many millions of human beings, is of South American origin, growing wild at various altitudes in the region of the

* Berghaus's *Physikalischer Atlas.*

CEIBA TREES NEAR BOLIVAR, VENEZUELA.

Andes from Colombia to Chili. Manioc and yams, even more indispensable to certain negro and West Indian populations of Latin America than the potato can ever be to the Germans and Irish, are also indigenous in the southern section of the New World. From the same region also come a species of bean, the tomato, the ground-nut, cacao *theobroma* ("food of the gods"), the pineapple, guava, chirimoya, and many other fruits now flourishing in the tropical zone of the Old World.

Sooner or later South America will supply the gardens of Europe with other economic plants not yet acclimatised, such as the quinoa, a species of chenopodium, whose seeds when ground yield a kind of bread; the arracacha root, which resembles celery; maté ("Paraguay tea"), which takes the place of tea in Argentina and South Brazil; perhaps, also, the ceiba (cheese-tree), which attains a great size in the Bolivar district, Venezuela. The industries have received from South America the sap of various rubber plants; and medicine is indebted to it for, amongst other products, such drugs as ipecacuanha; tolu balm; cinchona, which dispels fevers; and the coca leaf, which allays pain and the pangs of hunger.

In return the South American continent has been enriched by nearly all the alimentary and industrial species of Europe and Asia. The banana spread so rapidly in the hot regions that most naturalists supposed it to be indigenous; it was introduced into the New World by the now almost forgotten bishop, Thomas de Berlanga, the same benefactor of his kind to whom we owe the discovery of the Galapagos Islands.* Unfortunately, with the useful species came also the weeds of the Eastern Hemisphere. On the elevated plain of Bogota, as well as on the surrounding slopes, the foxglove (*digitalis purpurea*) thrives vigorously.

Fauna.

The fauna of the South American mainland is of a very distinct character. In this relatively isolated division of the globe the animal forms have necessarily diverged from the types prevailing elsewhere. But there survive none of the huge beasts of former epochs, such as the "mastodon of the Andes" whose remains are found in the gravels of the Chilian lacustrine formations. Hence South America has no longer any animals comparable in size to the Asiatic or African elephant, the giraffe, hippopotamus, or rhinoceros, the tapir being, in fact, the largest of all its mammals. There are, however, long-tailed apes, differing greatly from the anthropoids of the Old World, and from the lemurs of Madagascar.

The forests are infested by carnivora of the feline and canine families, by bears, martins, otters, and weasels, while the order of bats is represented by numerous species, including the blood-sucking vampire. South America has no camels, which are here replaced by the analogous but smaller llamas and vicuñas of the Andes. Various forms of marsupials range the whole continent as far south as the southern Argentine states and Patagonia. The avifauna has received an enormous development, containing no less than 2,300 species; and the fishes of

* Marcos Jimenez de la Espada, *Boletin de la Sociedad Geografica de Madrid*, 1891.

the inland streams and surrounding marine waters are even still more numerous. The manatee, one of the marine mammals frequenting the coast, penetrates far up the Amazons and its great affluents, and although actively pursued by the fishermen, it here maintains itself in scattered groups.

As has been shrewdly remarked by the learned zoologist, Jimenez de la Espada, the vast forests of the Amazons basin must have tended to modify in a uniform manner the habits, and consequently the organic structure itself, of all the animal species. The inextricable thickets of underwood, often flooded, and always pervaded by a heavy, stifling atmosphere, impede the free movement of mammals and even the flight of birds. Many forms which elsewhere live on the ground or fly low are here of arboreal habits, hopping or flitting from branch to branch amid the dense foliage of lofty trees. While all is still and silent in the low undergrowths, the leafy boughs struggling upwards to the light are alive with the songs and cries of their denizens. Here is the true life of the forest. The more majestic trees, such as the ceiba, are nearly always of solitary growth.

Despite the short period that has elapsed since their introduction, the domestic animals imported from Europe have already been modified by the changed environment. New breeds of horses have been developed, especially in the Argentine pampas and Venezuelan llanos. Here this animal had till lately increased prodigiously, as if striving to equal the multitudes of equidæ which roamed these plains in a former geological epoch. Throughout nearly half of the continent the horse had returned to the wild state, as had also the pig and horned cattle. Of dogs there still survive one or more of the old native breeds, one of which had been tamed by the Incas. The wild Indians of the Antis family also possess a species of black-and-white colour, long body and low intelligence, which hunts like our greyhounds. There is also the Fuegian dog, which resembles both the jackal and the fox. The American breeds have almost everywhere been crossed, and the more or less mixed European varieties are now everywhere dominant.

IV.

Inhabitants of South America.

The South American Indians—Peruvians or Caribs, Botocudos, Araucanians or Patagonians—are less famed in history than some of the North American nations, such as the Hurons and Iroquois. Thanks to the fascinating novels of Fenimore Cooper, the single Algonquian tribe of the Mohicans is more frequently mentioned than the most renowned aboriginal people of the southern continent. The expression "redskins," applied to the natives by the New England and Canadian settlers, has been too frequently used to designate all the indigenous populations of the New World, although scarcely applicable at all to those of the south.

But a sort of pre-eminence was conceded to the northern aborigines, as if they were in a superlative sense the typical branch of the American ethnical family. Yet the South American natives, whether of light or dark complexion, far outnumber those of the north. Some of their cultured nations, also, were at least fully as

civilised as the Aztecs and the other more advanced peoples of the Mexican plateau. Moreover, the Indians of Latin America, including these Mexicans themselves, have displayed more vitality, more power of resisting the destructive forces than the redskins properly so called. While the latter have either disappeared, or been for the most part swept into "reserves," the former still constitute the substratum of the population in the land of their forefathers.

The Aborigines.

All sixteenth-century chronicles are unanimous in asserting that the southern continent was thickly peopled at the time when the Conquistadores penetrated into the interior of the New World. Doubtless the leaders of the Spanish bands who carved their way through empires sword in hand often sought to enhance their glory by exaggerating the multitudes they had butchered. But apart from the vapourings of these ruthless adventurers, many a spontaneous remark, many a detail incidentally mentioned in the reports shows that the inhabitants were really numerous.

Authentic witnesses speak of whole districts, of spacious valleys, of vast plateaux where the natives were crowded together in towns and villages, but which a hundred years after the arrival of the whites had become complete solitudes. At the present time the heaps of refuse still found after three centuries on the plains of the Peruvian seaboard, as well as on the mountain slopes, the so-called *andenes*, or sustaining walls, following like flights of gigantic steps up the sides of the hills, recall the terraces of tilled lands which encircled the mountains as with wreaths of green crops.

A century after the Pacific slope had been wasted by the Spanish invaders, when the missionaries descended the opposite side into the Amazonian valleys, there also they found the land occupied by numerous tribes. One of them having asked a chief of the Jeberos how many nations dwelt in the forest regions round about, he replied, taking a handful of sand and throwing it into the air, "Countless as these grains of dust are the nations of this country. Not a lake, not a river, not a hill or a valley, not a plain or a forest but is filled with inhabitants."

Unquestionably millions of human beings perished through wanton cruelties, and especially by the forced labour imposed on the natives, who were literally worked to death. Their employment under the lash of the overseer in the mines and on the burning soil of the plantations; no doubt, also, the crushing burdens and weary marches of these "pack animals" along the rough mountain tracks, resulted in the rapid disappearance of nearly all those whom the conquest had delivered into the hands of white employers. Doubtless many tribes were able to avoid oppression by taking refuge in the mountains or the forests; but they were unable to escape the fearful mortality caused by the epidemics following in the wake of the invaders. Thus, in the seventeenth century a great part of the natives perished in the upland Amazonian valleys. Here the only resident whites were the missionaries, who strove to gather the Indians around them in peaceful communities; but by inducing their flocks to change their habits of life, they made

them the more susceptible to the ravages of disease. Whole populations were destroyed by small-pox, and in districts once occupied by flourishing villages, nothing is now seen except a few survivors encamped in the forest glades.

At the time of the great mortality following the conquest it was supposed that the aborigines were destined to disappear on the mainland, as they had already disappeared in Española and the other West Indian islands. Even long afterwards their ultimate extinction continued to be regarded as inevitable. But history has fortunately proved the contrary. After the period of decline the natives, transformed by crossings with the whites, are again increasing, if not everywhere, at least amongst their more important groups. Compared with the other great representative races of the world, they are advancing even at a more rapid rate than the whites, but they no longer advance as a distinct race. Henceforth the descendants of conquered and conquerors are merged in a single nationality.

Viewed as a whole, the southern aborigines are distinguished from those of the Laurentian and Mississippi regions by the colour of their skin, which is not coppery red, but presents, according to place and race, two distinct tints, olive-brown and yellow, with all the intermediate shades. Neglecting the minor groups, brown may be said in a general way to prevail amongst the natives of the Andes, yellow amongst those of the plains and of the Guiana and Brazilian uplands.*

To what is to be attributed this difference in the complexion of the two main divisions of the aborigines? Probably to more than one cause. The contrasts of climates, of pursuits, of habits, of food, all contribute in various degrees to produce contrasts in the colour of the skin. It must be especially borne in mind that the natives of the western slopes of the Andes live under a dry climate, or at least one far less moist than that of the eastern regions, that they are for the most part agriculturists, and that their diet is chiefly vegetarian. The hunting and fishing tribes of the plains are, on the contrary, far more carnivorous.

Differences occur in the shape of the skull, and in the stature, although the comparative tables of these discrepancies do not supply sufficient materials for a definite classification of the Indians based on racial characteristics.† While differing in many other respects, all the natives resemble each other in the quality of their hair, which is coarse, black, and lank, in their scanty beard, short chin, small, deep-sunk eyes, powerful jaws, and fine teeth. Physical deformity is extremely rare, which should be attributed to the perfect freedom of movement left to the children, nearly all of whom are allowed to run about naked.

Certain writers of the last century, notably Ulloa, who had, nevertheless,

* A. d'Orbigny, *L'Homme Américain*.

† Cephalic index of the South American aborigines, according to Hyades and Deniker:—

Extreme brachycephaly: Patagonians	85
Extreme dolichocephaly: Coroados of South Brazil	70

Stature:—

Highest: Patagonians, according to A. d'Orbigny	(mean) 5 ft. 10 ins.
Shortest: Galibi, according to Deniker	(mean) 5 ft. 2 ins.

visited the New World, but who had in view chiefly the morose and gloomy Quichuas of Ecuador, denied all intelligence to the South American aborigines. "They have neither discretion nor understanding"; they are "animals," "brutes," and so on. So also many settlers in Brazil called them *bichos do mato*, "beasts of the forest." But such expressions reflect chiefly on those who utter them. The fact is, these natives, like all other human races, share in our strength and our weakness, possess in various degrees our intellectual and moral faculties, rise to the performance of great deeds, and relapse into degrading practices, advance or recede according to the struggles in which they are engaged, the environment in which they dwell, the degree of liberty which they enjoy.

Several South American nations, such as the Muyscas, Quichuas, Aymaras, and other Andean races, made sufficient progress to entitle their social system to be called "civilised." They had acquired the arts of husbandry; they were able to make earthenware, to weave textiles, to work in copper, gold, and silver, to build edifices lasting for centuries, to carve statues, to embellish their vases and garments with artistic designs, to construct highways and bridges, and if not to write, at least to keep regular records by means of knotted strings.

Yet they lay under a heavy disadvantage compared with the peoples of the Old World. They possessed no domestic animals strong enough to supplement their own physical efforts. The extraordinary skill displayed by them in taming the beasts of the field gave them pets, but no fellow-workers. In this respect, they had nothing but the feeble llama and the dog to compare with the camel, the horse, the ass, ox, goat, and sheep possessed by the inhabitants of other continents.

The so-called wild tribes occupying the central and eastern forests have also their place in the history of human progress, and several of them have already begun to co-operate with the whites on a footing of equality. But the transition from one social state to another cannot be effected without profound disturbances. The hunting populations, who have succeeded in keeping aloof from the whites and mestizoes in the forests remote from the fluvial highways, or in their secluded upland valleys, have preserved their graceful carriage, their proud glance, and straightforward speech, whereas the enslaved peasantry tremble before their masters, bow their necks to the yoke, and carefully measure the words addressed with downcast eyes to their employers.

Chief Divisions of the South American Aborigines.

Thanks to the researches and linguistic studies of numerous intelligent observers, it has become possible to classify most of the aborigines according to their probable genetic descent, although difficulties are still presented by certain tribes remote from the bulk of their ethnical family. One of the best-defined groups is that of the Muyscas, or Chibchas, as they called themselves, who had formerly established their dominion on the Cundinamarca plateau, in the midst of numerous kindred tribes.

Farther south both slopes of the Ecuador and Peruvian Andes belonged to the great Quichua nation, followed in the present territory of Bolivia by the distantly connected Aymaras, ruder of manners, but of equally inoffensive

Fig. 13.—Main Divisions of the South American Aborigines.
Scale 1 : 60,000,000.

character. The southern extremity of the Cordilleras, with the dependent territories, formed the domain of the more warlike Araucanians.

In the eastern part of the continent the formerly powerful Carib (Caraïb) race, till recently supposed to be extinct, because no longer found in the Antilles, are still represented by various tribal groups, reaching far into the interior of the Amazons basin. Intermingled with them are the Arawaks of the Upper Amazons and other districts. But in their long conflicts with hostile

peoples, these Arawaks have mostly been worsted, and many of them have been scattered over the Guiana coastlands, while the bulk of the race has been pressed westwards to the foot of the great mountains. Here they are associated with the Antis, who have given their name to the Cordillera of the "Andes," and who formerly occupied parts of the Andean plateaux, as well as the eastern valleys, where the southern Amazonian affluents have their source.

The Miranhas and related tribes are limited to the region comprised between the left bank of the Amazons and its two tributaries, the Içá and Rio Negro. On the opposite side of the great river, the Panos group is dominant on the Ucayali and Madeira, and the Carayas on the Xingu and Araguaya, affluents.

In the extreme east the Botocudos of the Brazilian coastlands are a branch of the Ges race, whose numerous tribes follow from north to south, from the banks of the Tocantins to those of the Parana. But of all the Brazilian families the most important, for the number of its tribes and the extent of territory occupied by them, is that of the Tupi or Guarani, who have given their language to most of the natives of the interior, and who have approached nearest to the whites in general culture. Conterminous with them on the upper Paraguay dwell the Guaycurus, and in the Rio de Janeiro district a few remnants of the Goytacas or Puri, while the Charruas of the La Plata region are now represented only by half-breeds. But the Indians of the Patagonian family still possess several full-blood groups, and Tierra del Fuego has also its distinct ethnical family, driven from the mainland to this insular extremity of the continent.

Instead of classifying the South American Indians by their linguistic affinities, D'Orbigny and others have attempted to group them according to their physical characteristics. They might also be classified according to certain usages, such as tattooing, circumcision, filing the teeth, artificial deformation of the skull, and especially cannibalism. But in the vicinity of the white settlements the study of the aborigines becomes more and more difficult, owing to the rapid changes going on in their social and political state, as well as in their habits of life.

Certain tribes have disappeared either by actual extinction or by absorption in others, while many can no longer be recognised, owing to displacements accompanied by change of names. But great migrations have not been numerous during the four centuries that have elapsed since the discovery. The natives have scarcely shifted their camping-grounds, except in those districts where the advent of the Europeans was for them the signal of inevitable doom. Nevertheless, all those who have failed to enter the Latinised social system of South America by the process of miscegenation, present a uniform spectacle of decadence, which has to be described in almost identical terms in dealing especially with those regions where their forefathers were dominant.

The Half-Breeds.—Miscegenation.

Nowhere has the work of fusion between the various ethnical elements of the Old and New World made such progress as in the Andean regions. The

process may even be regarded as completed in all the more populous districts of Venezuela and Colombia, in certain parts of Peru, in north and central Chili, as well as in Uruguay and along the banks of the Plate river. On the other hand, nearly all the tribes of the eastern slopes of the Cordilleras, and in the great Amazonian forests, have preserved their social characters by keeping entirely aloof from the whites.

Farther east, on the Guiana and Brazilian seaboards, the populations of mixed origin again become dominant. But in these regions the process of miscegenation has taken place, not so much between the aborigines and the European settlers, as between the latter and the Africans, descendants of formerly imported slaves. In South America the strain of black blood increases in the direction from west to east, and the coloured element even greatly predominates in the Brazilian provinces which project nearest to the African continent. Full-blood families, whether white or black, are scarcely met at all along this eastern seaboard.

Besides the blending of the white type on the one hand with that of the Indians, on the other with that of the negroes, there occur, here and there, a limited number of half-breeds, the direct issue either of native men and African women, or of African men and native women. But as a rule the ethnical combinations are much more complex than such mixtures as these. During the course of the ten or twelve generations that have followed since the period of the conquest, the fusion of the various elements has assumed an endlessly diversified aspect. Although every individual half-breed may possibly be classified and denotated in a general way by his complexion and more salient features, the proportions vary beyond all calculation.

This ethnological problem is further complicated by the phenomena of atavism, in virtue of which the blends show a tendency to revert to one or other of the original types. The question of miscegenation, everywhere so difficult, should be studied especially in South America, where every town, village and hamlet in the neighbourhood of every tribe presents "specimens" of every conceivable variety. Attempts have been made to determine the comparative value of the results of such and such crossings. Thus, according to D'Orbigny, the issues of unions between different Indian races have always proved superior to either of the original types. So also the progeny of white men and Guarani women is distinguished by noble features and fine figures, nearly always of white colour from the outset, whereas Araucanian and Quichua mestizoes long preserve the characters of the native stock.

The fusion of negroes with Guarani women appears highly favourable for the physical improvement of the race. Other crossings are, on the contrary, regarded as baneful, resulting, as is asserted, both in bodily and moral degradation. But despite the facilities offered by the southern continent for the study of miscegenation, the subject is still involved in much obscurity. The fact, however, remains that, viewed as a whole, the population of South America is the most "human," representing the most complete fusion of the most characteristic primitive

elements—American Indian, African black, and white of Europe. Here is being physically developed the most representative race of the human species, taken in its entirety. In this respect what a contrast between this continent and North America, where the Anglo-Saxon race has kept mainly aloof both from the redskins and the blacks, thrusting them aside, and even exterminating them rather than sully their racial purity by contact with lower elements.

Historic Retrospect—The Revolution.

For over two centuries after the prodigious and horrible romance of the Conquest, the South American populations may be said to have been overcome by a heavy social and political sleep. Under the system of bondage imposed by the Council of the Indies, tempered or aggravated at intervals by the caprice of the viceroys, the natives and even the settlers of European origin ceased to have any historic existence; all intercourse with aliens involved confiscation of property and capital punishment. As if by a sort of embryonic life, the movement of the American nations was carried on, no longer on the surface, but in the depths of society, where was accomplished the transformation of hostile races into a compact nationality. Spaniards and Quichuas, Portuguese, Africans and Guarani were preparing for their second birth as South Americans. But meanwhile silence reigned supreme, jealously guarded from interruption by their rulers. The submission of the aborigines seemed absolute, and a force of 2,000 men sufficed for the Spanish Government to maintain an atrociously despotic administration over all those multitudes of enslaved peoples.

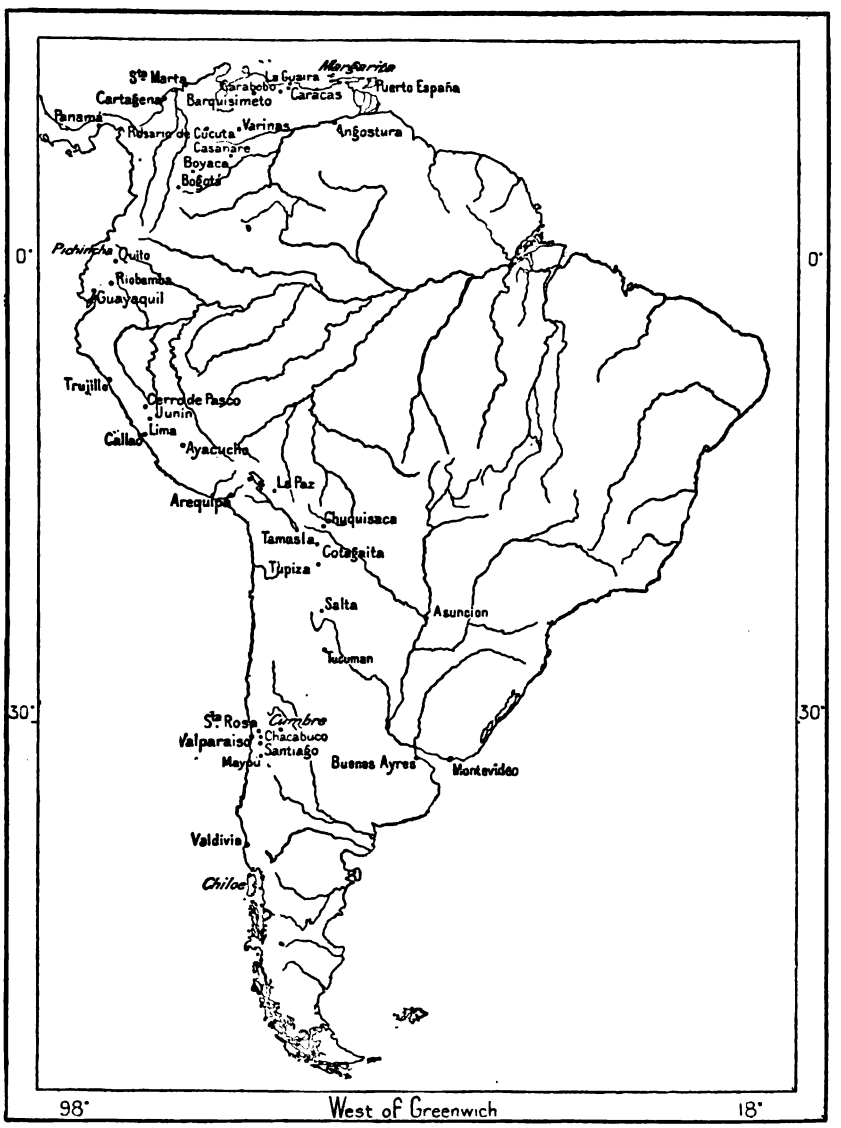
In such a vast region as South America, destitute of easy communications, and inhabited by peoples of diverse speech and origin, insurrections could not be organised for combined and sudden action. The partial and isolated struggles for independence were even necessarily attended and followed by reactionary movements. In Peru the first blow struck for emancipation, so far from being of a bold and resolute character, was, on the contrary, disguised under the form of a pretext for a "legitimist" restoration. In the revolt of 1780 the leader of the insurgents was a descendant of the Incas named Tupac Amaru, like the last sovereign of that race. But he was soon vanquished, and, like him also, perished on the gallows after the massacre of his followers.

The first Brazilian rising was inspired by a feeling of patriotism, its object being the expulsion of the Dutch from Pernambuco. After seven years of sanguinary conflicts it achieved its purpose, the insurgents storming the Batavian fortifications in the year 1634. Men of all Brazilian races, Indians, negroes and whites, had taken part in the struggle, and Fernandez Vieira, generally regarded as the hero of the war, was a mulatto. Later the negro slaves rose against their masters, and even founded in the interior a few independent republics, which enjoyed an ephemeral existence. Then came in 1798 the first attempt at political independence, led by Xavier, better known by the name of Tiradentes.

But the great South American revolution was heralded by a series of petty revolts, breaking out now in one place, now in another, all suppressed in their

turn, but only to reappear in ever-increasing numbers. Yet the movement would have been greatly retarded had not Europe itself been at that time in the throes of a political and social transformation. By upsetting the thrones of Spain and Portugal, Napoleon shook to its foundations the monarchical system in the New

Fig. 14.—Scene of the War of Independence in South America.
Scale 1 : 60,000,000.



World. The removal of the traditional sovereigns, alone regarded as "legitimate," afforded a pretext for those eager for independence to mask their designs under the plea of allegiance to the old dynasties, and thus the insurrection broke out in all quarters under the disguise of loyalty to the legitimate rulers.

Gradually the various elements of local revolution, in one place the discontent of the Creoles at the appointment of Spanish or Portuguese functionaries, in another racial hatreds between whites, blacks, and Indians, elsewhere the struggles of "the masses against the classes"—all was merged in the tremendous conflict between the innovators and the representatives of the old conservative ideas. In this conflict everybody, yielding to his sympathies, his traditions or interests, took sides with the party with which his personal feelings were most in harmony. Thus it happened that in the two armies, whites found themselves arrayed against whites, blacks against blacks, aborigines against aborigines. And so the very war itself had the effect of welding the three races in a more intimate national unity.

On issuing from the struggle the old Spanish colonies had, under the influence of the French encyclopedists, constituted themselves republics based on the model of the United States, while Brazil, still hampered in its evolution by the great number of its slaves, was satisfied with a change of sovereigns; it ceased to be a colony to become an autonomous empire.

The community of interests binding all the Brazilian slave-owners together, and the national cohesion presented by the various groups of settlements along the coast and on the inland plateaux, enabled Brazil to preserve a state of almost unbroken public tranquillity for one or two generations. But in the Hispano-American states the relations were very different. In these regions, differing in climate, relief of the land, origin, speech and customs of its inhabitants, conflicting interests gave rise to incessant struggles. Hence the attempt proved hopeless to unite in a single commonwealth of vast dimensions the Andean highlands, the seaboard and inland plains, the torrid and temperate zones, the Pacific and Atlantic coastlands.

At first it had seemed natural enough to merge in a single political body the immense possessions formerly owned by Spain in the New World. In fact, from the purely geographical standpoint, South America is admirably suited to be occupied by a united people. While resembling Africa in its general outline, it differs altogether from that continent in its internal structure, and in the perfect harmony of all its parts. Most of the regions on the African seaboard are completely isolated one from the other by solitudes and, till recently, unexplored tracts, whereas the regions of South America abutting on the great backbone of the Cordilleras, and watered by tributaries of the same mainstreams, stand in a relation of close mutual dependence. They constitute collectively a geographical unit of a strikingly simple character.

But if the salient features of the continent and the disposition of its relief forecast political unity in a more or less remote future, the actual distribution of the populations in widely diffused groups, and unconnected by any common trading relations, necessarily tended to create independent centres of political life. Federal decentralisation, followed by complete separation of the several states, was brought about by the very force of circumstances in each of the new republics.

The vast trackless territory, where news of the last importance took months to spread, broke of itself into several sections. The union established at the outset had been nothing more than a league against the common enemy, and when the Spaniard disappeared, how many national quarrels still remained to be settled! —hereditary racial feuds between Antis and Aymaras, Araucanians and Quichuas, Charruas and Guarani, with which were perhaps secretly associated the rivalries of presidents, the thirst of territorial conquest. The old Indian names of cities have been gradually substituted for the Spanish designations, and statues of vanquished heroes of the land have been set up in the public places, sure indications of jealousies still smouldering between the foreign and aboriginal elements.

After the political emancipation, the ancient traditions of a government marked by a strongly centralised administration could not be at once reconciled with the process of dismemberment taking place spontaneously. All the old capitals—Bogota, Lima, Buenos Ayres—still wanted to retain their jurisdiction over remote provinces, and in the ensuing struggles the alternating fortunes of the battlefield gave the ascendency now to one, now to another of the rival factions. The long and ruthless War of Independence, which covered the richest lands of South America with ruins, had also accustomed the eye to scenes of bloodshed and hardened the heart to the most savage atrocities.

The military enthusiasm stimulated by victory had also surrounded all the successful leaders with devoted adherents. Every ambitious captain was thus enabled to raise bands of armed followers to plunder a province, or, if the chances were favourable, to conquer a presidency. The love of strife entered into the marrow of the bone, and whole communities were found living in a chronic state of warfare. Social disorganisation was even promoted by the very abundance of material resources. Nothing was easier than to support an army of partisans on a conquered territory without any pay beyond the hope of pillage. Yet, although the South Americans have, so to say, passed their lives under fire, they have none the less made great strides in advance. The land has been gradually re-settled, the soil brought under cultivation, the local resources developed, while the substratum of the population has everywhere tended instinctively and incessantly towards national unity.

Communications.

Nevertheless the South American continent can scarcely be said to have yet acquired that elementary unity by which it might hope to become a common fatherland for its diverse inhabitants. The means of transport between north and south, between east and west, are still so difficult that they are little used, except by daring travellers. The seaboard continues to be by far the most important region in respect of population, agriculture, and trade. Here are grouped nearly all the large cities, here is centred all commercial life. Meanwhile the inland regions remain comparatively stagnant, the growth of population being necessarily extremely slow in the sterile southern district of Patagonia, and in the tropical Amazons basin too exuberant to attract settlers.

From Bogota to Santiago of Chili, no one ever dreams of taking the direct route by the upland Andes valleys. Travellers have to turn first north to take ship for Colon, then cross the isthmus of Panama, and set sail on the broad Pacific in order to reach Chili, and so ultimately arrive at their destination. So also an inhabitant of Ecuador wishing to visit east Brazil will not follow the great watercourse which he sees flowing at his feet and descending straight to the Atlantic. He finds it more convenient to circumnavigate the continent either by the northern route by the Caribbean Sea, or by the south round Cape Horn or through Magellan Strait. To get from one point to another in South America many travellers save time and money by first crossing the Atlantic to Europe. The Brazilian proceeding to Colombia will gladly make Paris the chief stage on his roundabout voyage.

None of the unavoidable land journeys from the periphery to the central provinces can be called easy except those across the contracted southern extremity of the continent between Valparaiso and Buenos Ayres. Everywhere else the goal can be reached only at the cost of great hardships and even dangers, and with the loss of much time—weeks, or even months. Certain Brazilian and east Bolivian cities, although situated in civilised lands, are as inaccessible as many wild regions in Central Africa and Asia. The trip round the globe has become much easier than the journey from plain to plain across the parallel ranges of the Cordilleras.

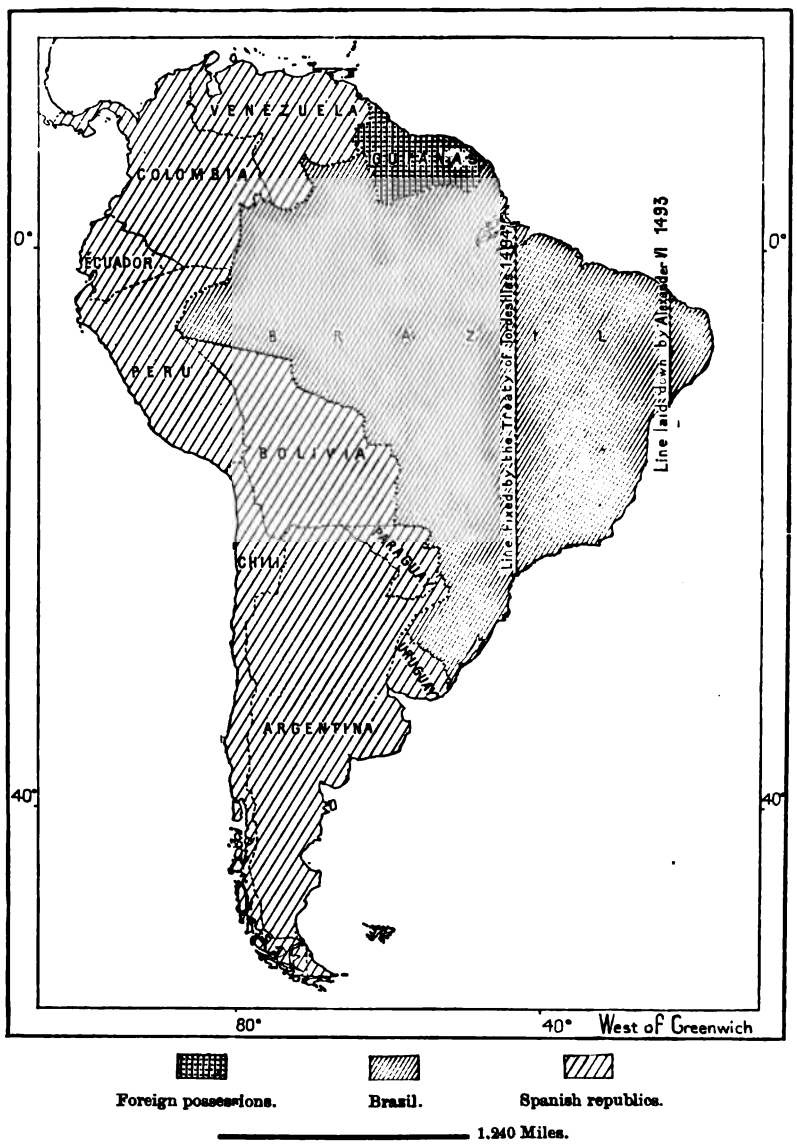
The Spanish and Portuguese Domains.

The natural dividing zone between the eastern and western sections of South America is indicated by the space almost exclusively occupied by aboriginal tribes, which is disposed in the direction from north to south along the foot of the Andes between the Orinoco and Parana affluents. This zone of separation between the regions inhabited by civilised man may also be regarded in a general way as the parting-line between Spanish and Portuguese America. The two unequal sections of the continent present a contrast in their distinctive features, which is all the more striking that the respective regions actually settled are still more remote, and have, so to say, no present points of contact.

In fact, to the existence of this intermediate neutral zone must be attributed the ease with which the Portuguese element has been able to expand westwards without encountering any serious obstacle on the part of the Spaniards. When Alexander VI., "slicing the world in two like an apple" (Oscar Peschel), shared it between the two conquering powers, Spain and Portugal, the latter state found itself endowed with a mere fragment of the present Brazil. But the very next year (1494) the Treaty of Tordesillas assigned it a much larger slice of the recently discovered continent. Even this frontier, however, was soon encroached upon by Brazilian adventurers, and especially by the intrepid "Paulistas," that is, the half-castes of the province of São Paulo, dwelling near the conventional parting-line. Such a frontier could, in fact, have been maintained only by a military cordon to defend it from encroachments. But at that time the Spanish

settlers, and even the missionaries, had crossed the crests of the Cordilleras only at a very few points, and could not dream of preventing the invasion of a territory of which they had no knowledge. Thus it was that Brazil, steadily moving west-

Fig. 15.—Continental Parting-Lines between the Spanish and Portuguese Domains.
Scale 1 : 60,000,000.



wards, gradually absorbed the whole of the natural region comprising the eastern foothills and the great wooded plains of the interior.

Occupying distinct geographical domains, Brazil and the Andean and Argentine republics have been historically developed on faintly parallel lines. Their populations, differing in speech as well as in their traditions and usages, have but a feeble sentiment of a common solidarity. Nevertheless, recent events, which

have replaced the imperial system in Brazil by a federal republic analogous to that of several Hispano-American states, will have the inevitable consequence of bringing the two groups of Latin populations into closer contact, especially in the

Fig. 16.—Ethnical Divisions of South America in 1893.

Scale 1 : 58,000,000.

La Plata basin, where Brazil is conterminous with Paraguay, Uruguay, and Argentina. Here a levelling process in social respects, and even in speech, is already in progress between the neighbouring populations.

But, despite all contrasts, South America remains as a whole the Latin continent in a pre-eminent sense. With the exception of Trinidad and Tobago,

Curaçao and neighbouring islets, British and Dutch Guianas, and the Falkland archipelago, the whole territory belongs to peoples of Romance speech, while the largest stream of immigrants directed to this region are Italians, the most direct heirs of Roman culture. Thus the ruling race in this part of the world presents a sort of balance, in its different character and natural genius, to the Anglo-Saxons dominant in North America from Labrador to the Rio Grande.

The Spanish and Portuguese Americans, yielding to the influences of French culture, and looking towards Paris as towards a metropolis, reflect French ideas in their literature, their fashions, and pastimes. Till recently the tie between the old Spanish colonies and the mother country had been almost completely severed in consequence of the rancour engendered by the War of Independence. Now, however, it has been again strengthened, thanks to their common origin and language; thanks also to the increasing tide of immigration, in which the Basque element has taken a large part.

In Brazil active relations have always been maintained with the old sovereign state, Portugal, having never been interrupted by any war. From Oporto and Lisbon crowds of Portuguese immigrants take passage for Bahia and Rio de Janeiro, although in recent years they have been outnumbered by settlers from the Italian peninsula.

Foreign Relations.—Railway Projects.

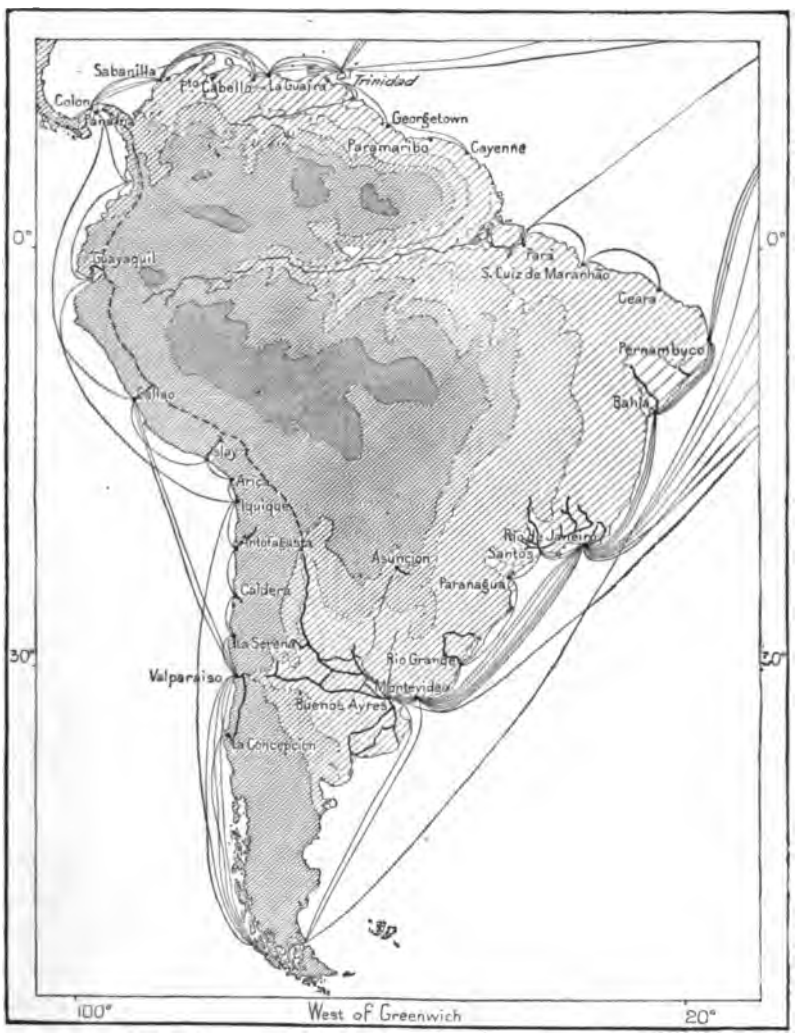
The share of Spain in the foreign trade of her old American colonies is relatively slight, far inferior to that of other nations, such as Great Britain, France, Germany, and the United States. On the Pacific seaboard the English, formerly excluded from all right of intercourse with the Spanish main, have now more than one half of all the exchanges. Hence, so far as regards its foreign trade, South America cannot be said to have preserved its character of a Latin continent. The settlers come from the Europe of Romance speech, while the merchandise is for the most part imported from the English-speaking world, Great Britain and the United States. These relations will probably continue until such time as the local industries may enable the Spanish and Portuguese republics to become independent of foreign manufacturers, or at least to give the first place to the inland trade between the conterminous states.

But were the projects of certain United States politicians to be realised, Latin Europe and even England would be completely excluded from all commercial dealings with the southern division of the New World. A skilfully arranged custom-house league, analogous to the German *Zollverein*, would place the consumers of South America completely in the hands of the producers of North America. With a view to developing these plans, the United States traders, supported by a "bureau" of the American republics installed at Washington, have already organised numerous lines of steamers to ply regularly between New York, Boston, Philadelphia, Baltimore, San Francisco, and all the more important points along the South American seaboard. New lines are yearly established, and at the Pan-American Congress of 1889 the delegates of the Southern republics were

assured that the communication between North and South would soon become still more frequent and rapid.

Nor is this all: although the sinuous form of the Central American isthmuses, their oblique disposition to the meridian, and the easy communications by water

Fig. 17.—Zones of Distances between London or Paris and South America.
Scale 1 : 60,000,000.



Distances by time.

15 Days.	15 to 20 Days.	20 to 25 Days.	25 to 30 Days.	30 Days to 2 Months.	2 Months and upwards.

Regular steam service. Railways. Projected Andean line.

1,240 Miles.

along both shores render absolutely useless a longitudinal railway between the volcanic plateaux of Guatemala and the Colombian forests of the Atrato valley, the United States Government has given countenance to the project of such a trunk

line, as being of the first importance for connecting in a single system the innumerable railroads of North America with the few that have hitherto been constructed in the southern continent. In Congress a chart was even exhibited showing tracings of the main lines which were, as if by enchantment, to bring into close proximity the great cities of the New World now separated by journeys of weeks or months. But since then little has been heard of these grand schemes, although partial surveys have been made of some of the sections.

According to these tracings, the first section of the southern trunk line would ascend the Cauca valley to Popayan, and run thence to Quito and Cuenca, and so on through the Upper Amazons valley to the Cerro de Pasco. From this point the route is continued towards Cuzco, descending to Jujuy after skirting the banks of Lake Titicaca and its emissary.

There is little doubt that this part of the project will eventually be realised, unless, indeed, the value of land routes as means of communication becomes suddenly minimised by some perfected scheme of navigation through the aërial spaces. Peru and Chili already possess some completed railways, forming important links in the future longitudinal line along the Pacific seaboard. From Rio de Janeiro and Buenos Ayres, also, dozens of branches are already diverging in the direction of those which are one day to descend the eastern slopes of the Andes towards the Atlantic.

The cordillera skirting the Pacific will serve to indicate the route to be followed by the great inter-continental trunk line, for all the chief cities are situated along its base, in its longitudinal valleys, and on its plateaux. The maritime routes on the Pacific side are also disposed in the direction of the meridian along the coast of South America, and parallel with the Andes. Except under the latitudes of Panama and of Magellan Strait, the boundless waste of waters stretching from the Andean region westwards to Australasia is rarely traversed by navigators. None of the oceanic regions within the temperate zones are more desolate.

Social Condition.—Material Progress.—Prospects.

Amongst diplomatists and politicians it was long customary to affect an air of contempt or of hopelessness in speaking of the Hispano-American republics; and this attitude seemed justified by the language of those South Americans themselves whom the vicissitudes of party politics had deprived of power and sent into exile. Having lost their fortunes or their prestige, they fancied that the country itself was lost. Even Bolivar, who had nevertheless grasped the highest honours before experiencing the ignominy of defeat, was said to be one of those who despaired of the fatherland, and reference has often been made to the words uttered by him on his dying bed: "Those who serve the revolution plough the deep."

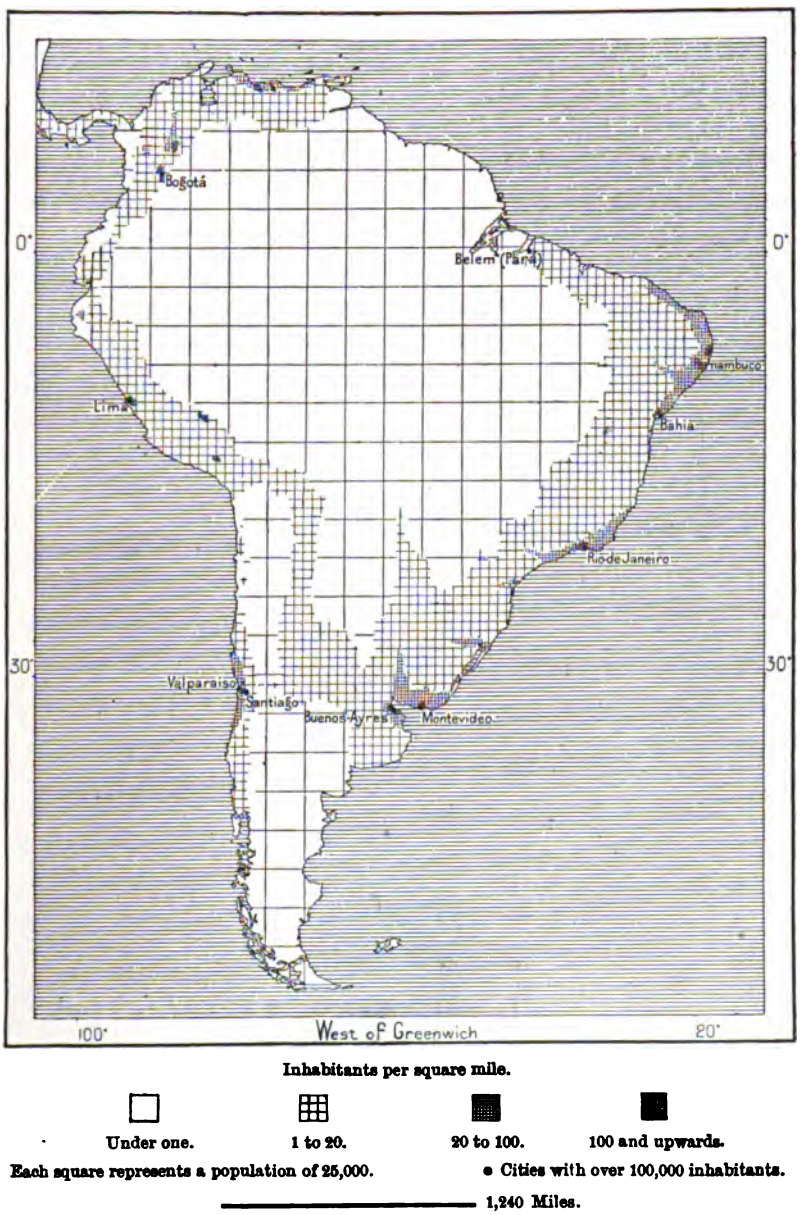
Nevertheless, if the present material and social condition of the South American populations be compared with what it was during the last years of the colonial system, it will be found that during the six or seven decades of political independence great progress has been made in population, wealth, and general education. The advancement in these respects has been relatively far greater than that of

many European nations during the same period. The official statistics are an eloquent reply to the pessimists.

Such has been the progressive development of the South American populations that some writers have already asked whether the Spanish tongue may not

Fig. 18.—Density of Population in South America.

Scale 1 : 60,000,000.



Inhabitants per square mile.

Under one. 1 to 20. 20 to 100. 100 and upwards.

Each square represents a population of 25,000. • Cities with over 100,000 inhabitants.

1,240 Miles.

one day have some prospect of success in its rivalry with English for the ascendency amongst the dominant languages of the world. The Spaniards of the New World, including the Mexicans, the Cubans, the inhabitants of Puerto Rico and of

Central America, already far outnumber those of the mother country. The Brazilians also are three times more numerous than the Portuguese, and with every year these discrepancies are widened to the advantage of the Ibero-Americans.

At present there are in Europe, in the Philippines, in Africa and America altogether about 62,000,000 who speak Spanish, or, at least, for whom Spanish is the language of culture. If the present rate of increase be maintained, if all the peoples placed under the control of the Hispano-Lusitanians accept this language, the communities of Spanish speech will be doubled by the year 1920; that is, in a century from the emancipation of the Hispano-American colonies, Spanish and Portuguese, which are near enough to be regarded as mere varieties of the same language, will be spoken by 180,000,000 human beings.*

The important part reserved in the near future for the language of Cervantes will also be justified, for the Hispano-Americans are continually contributing books of merit, occasionally even works of permanent value, to the common treasure of their literature. They have, moreover, the consciousness of their high destinies. Years have passed since the Argentine poet, Marmol, sang the future glory of his fellow-countrymen: "Ah! that I might be born again in those days of golden dreams! That it might be given to me to listen with softened spirit to the delightful symphony of thy future poets! But I hear them already! Poor exile that I now am, begging a country and freedom, I already see thy future glory, my mother!"

* Gabriel Carrasco, *Boletin de la Sociedad de Geografia de Madrid*, 1891.

CHAPTER II.

ANTILLES OF THE VENEZUELAN SEABOARD.

I.—Tobago, Trinidad, Margarita, Leeward Group.

THE islands lying in proximity to the Venezuelan coast, and usually grouped with the Antilles, are not to be regarded as all belonging to the same formation. They are, in fact, of diverse origin, and Tobago, easternmost of the series and geographically harmonising best with the West Indies proper, is yet invisible from Grenada, the nearest member of that system. The two islands are also separated by great oceanic depths, while the waters shoal gradually from Tobago towards the mainland. This island is also disposed south-west and north-east, nearly in a line with the heights of Trinidad.

Trinidad itself is obviously a mere fragment detached from the continent by a disturbance of comparatively recent date in geological time. Margarita and neighbouring islets constitute, on the other hand, the remains of a mountain range which formerly ran parallel with the Cumana (Cariaco) peninsula. Lastly Tortuga, Curaçao and other western islands, sometimes collectively called the "Leeward Group," like the southern section of the Antilles proper, form another chain running with great regularity for a distance of 370 miles in the same direction as the first ranges of the Andes system in Venezuela.

Advantage was taken by the European naval powers of the position of these islands at some distance from the mainland to detach most of them from the Spanish main. Of the larger members of the group, Margarita alone remained in the possession of Spain, and thus passed to the State of Venezuela, together with the valueless islets and reefs of Coche, Cubagua, Tortuga, Los Testigos, Blanquilla, Orchilla, Los Roques, and Birds (Aves). But Tobago in the east and the neighbouring Trinidad, most important of all, were annexed to the vast colonial empire of Great Britain, while Curaçao, Buen Ayre, and Aruba in the extreme west still remain Dutch colonies.

II.—Tobago.

Tobago, as it is called by its English masters, projects in the form of a spear-head to the north-east of Trinidad. Its real name is *Tabaco*, a word which recalls

the kind of pipe in use at the time of Columbus amongst the Carib natives, smokers of *cohiba* (tobacco). These Indians, being too weak to resist their powerful neighbours and hereditary foes, the Arawaks of Trinidad, were compelled, soon after the discovery of the New World, to take refuge in the island of St. Vincent. Here they became amalgamated with the older indigenous inhabitants, constituting with them the formidable people who were long regarded as the "Carib" nation in a pre-eminent sense.

Tobago, being thus completely deserted, was open to free European settlement, and in 1632 some traders of Flushing seized the opportunity to found the colony of Nieuwe Walcheren in the island. But even before their defensive works were completed, the Dutch intruders were surprised and massacred, or carried into bondage by the Spanish settlers in Trinidad, guided to the place by some Arawak Indians.

For some twenty years Tobago again became a solitude, serving only as a temporary station for fishermen and passing mariners. A seafarer wrecked on this island, uninhabited at the time, furnished Defoe with the chief materials for the history of Robinson Crusoe.

But the Dutch people of those times had far-seeing views and indomitable perseverance. In 1654 the brothers Lampsins, also Flushing traders, founded a new factory in Tobago; without, however, making it a political dependency of the home government. On the contrary, they gave it an international character, constituting it a port of call for merchants of all countries, English, French, and even Spaniards. Soon after a rival establishment was formed in another part of the island by some settlers from Courland, sent thither by James I. of England. But the Fichilingos (Pichilingos), as the Flushingers were called by the Spaniards, being wealthier and also reinforced by fresh arrivals, got the better of the Courlanders, and made themselves masters of the whole island. In order to enjoy their little domain in greater security, the head of the Lampsins family declared himself a vassal of Louis XIV. in 1662, and became "Baron de Tobago." Yet from this very suzerain came in 1677 the insane order to destroy the Dutch factories where some banished French Huguenots occupied a populous quarter, highly esteemed and beloved by the other colonists.

During the course of the eighteenth century the settlement of Tobago continued to make steady progress; but although the island was regarded as neutral, it ended by becoming English, thanks to the increasing number of British settlers, and in 1763 it was ceded by treaty to Great Britain. The change of political masters had for almost immediate consequence a corresponding change in the ownership of the land. The French proprietors were replaced by the later immigrants, the bulk of whom were "thirty-six-months Scotchmen," that is to say, colonists transported to the island by the planters free of charge in return for thirty-six months' unpaid service. By a formal order of the colonial assembly issued in 1793, the French were expelled from the island, and their property confiscated for the benefit of the great landowners.* Even still, despite the abolition of slavery, in consequence of

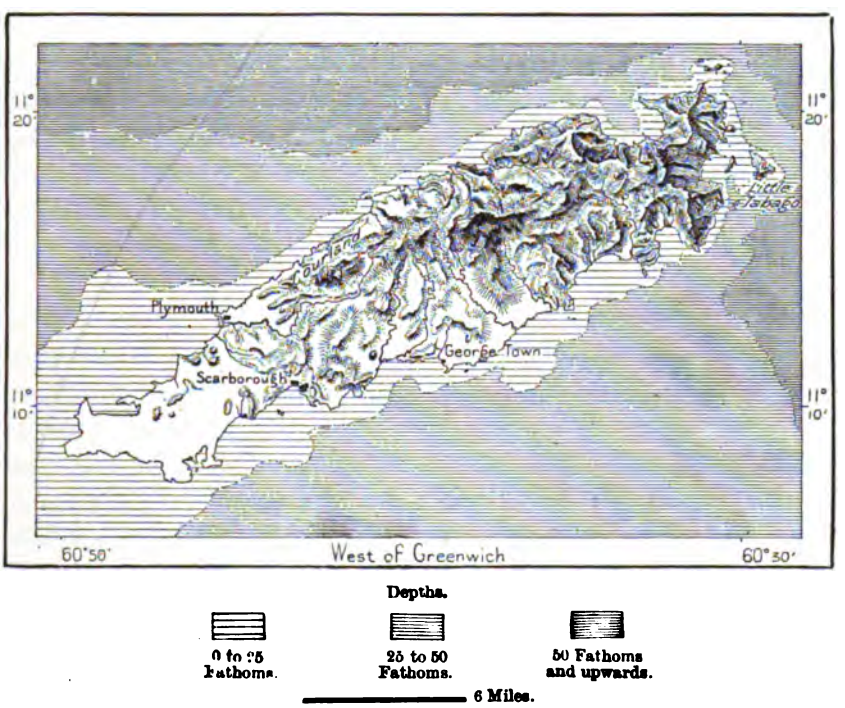
* J. J. Dauxion Lavaysse, *Voyage aux Iles de Trinidad, de Tobago, &c.*

which in most of the islands the land has passed into the hands of the negroes, Tobago continues to be divided into large domains, occupied chiefly with the production of sugar.

The whole island may be regarded as forming a single chain of heights with a total area of less than 120 square miles. The highest eminence has a height of not more than 2,130 feet, or, according to the marine charts, a little over 1,900 feet.

In consequence of its oblique position to the meridian, Tobago lies well in the track of the trade winds, so that both shores, running south-west and north-east, enjoy the same purifying marine breezes. Both sides also have the advantage of some well-sheltered natural havens. The heights of the central district

Fig. 19.—Tobago.
Scale 1 : 470,000.



rising above the sugar plantations and the palm-groves along the seashore are still forest-clad. The more rocky escarpments are overgrown with thickets of the "pimento" myrtle, which yields the so-called "allspice," a berry of a highly agreeable aroma. The berry is eagerly devoured by swarms of parrokeets, who form a sort of confederacy warding off all other birds from the thickets.

Like that of Trinidad the rich native flora is essentially South American, interspersed, however, with numerous plants from the West Indies. Its fauna also includes a few birds not found in the neighbouring island. One of the inlets on the coast was formerly known as the "Idlers' Cove," from the large number of turtles that resorted to the place to deposit their eggs. The inhabitants had only

to turn these animals over to obtain an abundance of food. But here as elsewhere turtles have become rare, and the struggle for existence has grown as intense as in most other places.

There are no longer any full-blood aborigines, who, according to Lavaysse, had been reduced in 1803 to three families, comprising altogether 26 souls. At present the great bulk of the population consists of blacks and people of colour, settled in the villages and on the plantations, which form a vast belt of gardens round the whole island. In 1871 the white population numbered only 120 persons. *Scarborough*, the capital, lies on an inlet of the south-west coast facing southwards. Although a mere hamlet, it is the centre of an export trade which in 1891 exceeded £24,000, and which before the fall of prices in the sugar market averaged £80,000 a year.

III.—Trinidad.

The *Yere* of the natives, re-named *Trinidad* by Columbus in 1498, in honour of the "three Persons united in one God," is one of the largest islands washed by the Caribbean waters, ranking in size next to Puerto Rico, whose almost geometrical outlines it faintly reproduces. Like Puerto Rico it has the form of a rectangle, which is compared by the Spaniards to an "oxhide" from the two peninsular appendices prolonging the north and south coasts in the direction of the mainland.

Physical Features.

From the geological point of view Trinidad is a fragment of the Venezuelan region. The rim of rounded crests skirting its north side is continued on the continent by the Paria range, which in its turn reappears beyond the Cumana Gulf in the elevated chain separating the Caribbean Sea from the elevated plains of Caracas and Valencia. In the island and on the mainland the formations are everywhere the same, plutonic and metamorphic masses of a highly compact argillaceous schist, whose steeper escarpments face seawards. Despite the two breaks in the chain, at the Dragon's Mouth and the Gulf of Cumana, the axis of the system maintains its regular trend from Galera Point to Puerto Cabello, a total distance of about 500 miles, inclining but slightly from a line parallel with the equator. Beginning at the easternmost point of Trinidad under 10° 50′ 15″ north latitude, the coast range crosses the 10th degree at the point where it is deflected south-westwards to merge in the general system of the Andes proper.

The break which occurs in the coast range between the Gulf of Paria and the Caribbean Sea is, moreover, studded with islands and islets representing the crests of submerged hills, which form a continuation of the north-west headland of Trinidad. The opening between the gulf and the open sea is thus decomposed into several channels, such as the Boca de los Monos, the Boca de los Huevos, the Boca de Navios and the Boca Grande. In this inlet, which represents the combined erosive action of the marine and Orinoco currents, the greatest depth in the main channel is about 150, and in the smaller passages 100 fathoms, while the

coast ranges vary in mean altitude from 1,500 to 3,000 feet. The two culminating points, Tucutche (Las Cuevas), in the middle of the cordillera, and the Cerro de Aripo in the north-east, attain the respective heights of 3,100 and 2,644 feet. The rugged crags of the Dragon's Mouth are over 650 feet high, one of them in Mono ("Monkey") Island rising to 1,000 feet. But even on the steepest slopes strewn with ruptured blocks, the bare rock is everywhere concealed by a leafy vegetation.

South of the chain of primitive rocks skirting the north side of Trinidad the plains and undulating tracts constituting most of the surface belong to the same cretaceous horizon as those facing the coast range along the Gulf of Cariaco, as well as those reappearing west of the Unare to the south of the Caracas coast range. The uniformity of the inland plains is broken only by Mount Tamana, a solitary mass 1,028 feet high, and mariners plying on the Gulf of Paria guide their course by the crest of Mount Naparima, which rises 590 feet above the water near the town of San Fernando.

Lastly, the south side of Trinidad, which, like the north, affects the aspect of a coast range, consists of dunes and tertiary rocks, as does also the chain of heights which, beyond the muddy banks deposited by the Orinoco and neighbouring streams, forms the northern edge of the llanos.

The south-western, like the north-western, peninsula terminating the Trinidad quadrilateral is continued towards the mainland by an islet, some reefs and the Soldado rock, which at a distance resembles a sail, and which is enveloped in a cloud of countless sea-fowl. Thus in all the elements constituting its framework Trinidad is essentially a part of the mainland. Even the shores of recent formation, by which its surface is increasing, are of continental origin. The sands and muds, which develop a convex curve on the east side washed by the Atlantic, have been brought down by the currents of the Amazons, of the Guiana rivers and the Orinoco. The channels of the Serpent's Mouth, giving access to the Gulf of Paria along the south side of the island, are no longer deep troughs like the northern channels of the Dragon's Mouth. They have already been partly filled in by the alluvial matter washed down with the Orinoco current. The yearly soundings show constantly varying results. Thus the east passage has shoaled from 8 to 4 fathoms, while in that of the west beyond the Soldado reefs the line everywhere reveals 12 or 13 fathoms; here the marine bed is incessantly scoured by a regular current.

Geological Changes.

Trinidad gives undoubted evidence of having undergone great geological revolutions. Erosions have taken place to a vast extent, as shown by the masses of quartz, containing some magnificent rock crystals, which are met on the plains, in the valleys, and on the hillsides. These are evidently the remains of old crystalline rocks, all the softer parts of which have disappeared, either changed to alluvia or carried away to the sea. Great beds of gravel or shingle 300 or 400 feet thick are seen at the southern entrance of all the valleys along the northern coast range. In a more northern zone, such, for instance, as Scandinavia, moraines would

certainly be found in this district. As it is, the detritus must be regarded as the débris of cliffs undermined by the marine waves beating against the foot of the hills raised by successive thrusts above sea-level.*

The central districts comprised between the northern and southern coast ranges present in the neighbourhood of the sea extensive expanses which were formerly marine inlets; now they are filled to a great depth with alluvial matter formed by the decomposition of mangroves and other plants. Possibly to the presence of this fluvial sediment is to be attributed the absence of continuous coralline formations on the coasts of Trinidad. Here and there, however, there occur a few coral reefs, fragments of which are strewn on the beach after every storm. The gradual subsidence of this part of the coast is placed beyond doubt by the numerous dead tree-stems on the beach, killed by the surging tide.†

Reference is often made to "volcanoes" in various parts of the island; but there exist only some groups of "mud volcanoes," one of which, towards the centre of the island, rises 135 feet above a morass called the "Lagon Bouffe" by the Creole negroes. Those of Cape Icacos at the south-west extremity, surrounded by swamps and fringes of mangroves, are conic hillocks, some mere molehills, others from 14 to 16 feet high. All are pierced by a terminal vent, whence escape periodical ejections of a whitish substance tasting like alum, and emitting an odour like that of sulphuretted hydrogen. The muddy waters bubbling up to the surface have no higher temperature than that of the surrounding atmosphere, although they at times eject shingle and lumps of sulphur with great force. According to the residents the Cape Icacos mud volcanoes utter bellowings every year about the spring equinox, and at this period also are said to occur the eruptions of pebbles, accompanied by the uprooting of trees.

An old map indicates in the Gulf of Paria an islet which was said to have made its appearance simultaneously with a violent earthquake on the neighbouring mainland. In several parts of the south-western peninsula are seen beds of porcellanite, clays, and vitrified sands which have assumed the appearance of jasper. These beds, which are of no great thickness, and which occur in the midst of the quicksands, have evidently been exposed to the action of fire, like the slag of smelting furnaces, and they are supposed to have resulted from the burning of asphalts or lignites.

This part of the coast also appears to be in process of subsidence like that of the east side. Thus two forces acting in opposite directions are continually modifying the contour-lines of the island—that of the currents depositing sediment on the beach, and gravity or some other agent causing certain parts of the coast to sink.

The Asphalt Lake.

In the same south-western peninsular district is also situated the "marvel" of the island, the so-called Brea, or Asphalt Lake, one of the greatest natural

* G. P. Wall and J. G. Sawkins, *Report on the Geology of Trinidad.*
† Charles Kingsley, *At Last, a Christmas in the West Indies.*

THE ASPHALT LAKE, TRINIDAD.

curiosities in the world. The basin, which occupies rather more than 100 acres on a slight rising ground about 85 feet above sea-level, usually presents the aspect of an exposed coalpit; but during the great heats the surface liquefies to a depth of about an inch. Even before the contents began to be worked for industrial purposes, the surface underwent frequent modifications; islands were formed and rapidly covered with agaves, wild pineapples and other vegetable growths; then they were swallowed up by the surging flood of pitch, to reappear on the circumference of some sluggish eddy in the viscous substance.

The underground forces acting on the asphalt cause it to rise in masses of unequal size, rounded off like huge toadstools and separated by narrow spaces filled with water at the normal temperature of the surrounding atmosphere, in which fishes disport themselves. The visitor may walk without any risk on the solid asphalt round the margin of these channels. although, according to the report of numerous travellers, the surface yields gently under the weight.

Towards the centre of the lake the bituminous substance is continually rising, mixed with sulphurous gases, and it often ejects logs of wood, branches or stems completely transformed by the saturating matter. The wood thus cast up always presents its pointed end to the air, so as at times to resemble rows of stakes. The pitch, which is very impure and consequently of small commercial value, contains from about one-fifth to cne-third of earthy matter. The 78,000 tons exported in 1890 were valued at a little over £90,000.

The soil of the cultivated district encircling the lake is also charged with asphalt, yet is extremely fertile, yielding the best and finest fruits in the island. The pineapples especially are less fibrous, larger, more fragrant, and of a more golden colour than elsewhere. The very road leading from the lake to the neighbouring port of La Brea runs through a bed of pitch, and moves slowly seawards like a black glacier. The little houses erected along the track follow the same onward movement, so that they have to be periodically rebuilt. The shore also is fringed with bituminous reefs, and some 800 yards south of the headland a yawning chasm in the bed of the sea occasionally discharges boiling masses of petroleum, which rises and spreads out on the surface of the water.

Under about the same latitude, but in Mayaro Bay on the east side of the island, there occurs another submarine vent, whose eruptions, according to native report, take place with a certain regularity in the months of March and June every year, and are accompanied by a roar as of thunder, and apparently also by "flames." It is at all events certain that on these occasions the sea casts ashore lumps of hard, black and shining asphalt, which is collected by the inhabitants of the district. So long ago as 1805 it was manufactured by the English into a tar used for caulking purposes. According to Wall and Sawkins, the geologists who have most carefully studied this region, the asphalts both of the island and of the neighbouring mainland are derived from vegetable remains which, under temperate and polar climates, would assume the forms of turf and lignite.

Rivers—Climate.

Thanks to an abundant rainfall, Trinidad is watered by numerous streams which are navigable by small craft for a considerable distance from the coast. The Caroni, most frequented of these rivers, bears a Carib name, which recurs in various parts of the neighbouring continent. It flows nearly parallel with the north coast range, from which it receives its chief affluents, and falls into the Gulf of Paria, near Port of Spain; but during the floods a considerable portion of its waters are discharged laterally into riverine marshes. The Caroni is navigable by boats for about 24 miles, and it is proposed to connect this waterway with the Oropuche, on the eastern slope of the island, by means of a canal cut through the slightly elevated central waterparting.

The Guaracuaro, which falls into Naparima Bay on the south-west coast, develops a course symmetrical with that of the Caroni, while the Nariva (Mitan) and Guataro (Ortoir) have a common delta towards the middle of the east coast in the great curve extending from Galera Point to Galiota Point. Between the two mouths runs a channel protected from the surf by a fringe of mangroves. Numerous lagoons, the "lagons" of the French creoles, skirt the low-lying coast on both sides of the delta.

Lying entirely in the track of the trade winds, and being practically a part of the mainland, Trinidad escapes from the thousand vicissitudes of climate to which the Antilles proper are exposed. The seasons follow in the normal sequence, and during the *verano* ("spring") or dry season, lasting from November to the end of April, scarcely a drop of rain ever falls. The moisture collected on the surface is derived mainly from the heavy dews. But in the wet season, from May to October, storms are of almost daily occurrence. They are accompanied by sharp, heavy showers, coming on suddenly, especially in the afternoon, and never at night except a short time before dawn. Neither Trinidad nor its neighbour, Tobago, is ever visited by those terrific hurricanes by which Grenada, some 85 miles to the north-west, is frequently wasted.

Flora—Fauna.

As in its geological structure and climate, Trinidad contrasts also with the Antilles proper in its flora and fauna. In their natural history both Trinidad and Tobago are mere dependencies of the South American continent. The former presents in its central part extensive tracts covered exclusively with grasses and plants of low growth in every respect similar to those of the Venezuelan llanos. They are savannas analogous to those traversed by the Orinoco and its affluents, and in the central parts of the island geologists, in fact, suspect the former presence of a great fluvial current.

But the treeless spaces are everywhere encircled by dense tropical woodlands, where flourish, in the closest proximity, nearly all the innumerable species belonging to the forests of Guiana. These multitudes of trees, lianas, and parasites of all kinds are amply fed by the yearly rainfall, which is estimated at nearly 80 inches.*

* Mean temperature of Port of Spain, 77° Fahr. Rainfall (mean of twenty-five years), 67 inches.

Botanists have not yet exhausted the study of the insular flora, which contains no less than 140 species of trees with bark possessing medicinal and especially febrifugal properties; timber and cabinet-woods are reckoned by the hundreds, nearly all of South American origin, although some West Indian and even African forms occur. Such is the *rhypsalis cassytha*, a cactus of Angolan origin, and the only member of this family found in the Old World. Amongst the forest giants special veneration is paid to the ceiba (*eriodendron anfractuosum*), which the negroes generally refuse to fell, regarding it as a magic tree. Anyone

Fig. 20.—View taken at Saint James, Port of Spain, Trinidad.

bold enough to apply the axe to its roots without first propitiating it with a bottle of rum, would inevitably die within a year, and other calamities would overtake those throwing stones at it.

The palm family is represented by numerous species, amongst others the *oreodoxa*, some of whose stems exceed 150 feet in height; the timit (*manicaria*), whose leaves are used for thatching cabins; the *mauricarea aculeata*, the *desmoncus*, and others, armed with formidable thorns. According to a local tradition, a vessel freighted with coconuts from an island in the Orinoco delta was shipwrecked in 1730 on the east coast of Trinidad, where the nuts washed

ashore took root in favourable soil. Such is said to be the origin of the Cocal, a narrow belt of superb coconut-palms, which develops a crescent along the coast between Mancenillier and Guataro Points. The traveller passing from the virgin forests of the interior into the Cocal might fancy he had been suddenly transported, as if by magic, from the West Indies to the Laccadives, Maldives, or some other East Indian group.

Beneath these avenues of bending amber-coloured stems the beach is strewn with the trunks, branches, and leathery fruits of the timit, brought by the marine current from the Orinoco delta. The west coast, also, near Port of Spain and San Fernando, has been planted with the coconut-palm, which has the advantage of draining the soil. But while exotics are thus introduced, the primitive woodlands are recklessly destroyed, and extensive tracts have been already shorn of their leafy adornments. Hence the rivers also have become more irregular in their discharge, and less easily navigated.

Like the flora, the insular fauna is also mainly South American, and of equally varied character. According to the naturalist Léotaud, Trinidad possesses as many as three-fourths of the number of bird-forms found in all Europe. Unfortunately the blacks, all now provided with fowling-pieces, have already depopulated the greater part of the woodlands. Humming-birds, formerly very numerous, have nearly disappeared, shot in myriads to supply the demands of European fashion; as many as 15,000 a week were at one time forwarded by a single dealer. On the other hand, the farmyards abound with poultry, no climate apparently suiting the gallinaceous family better than that of Trinidad.

Amongst the extremely varied inhabitants of the surrounding waters several besides the shark are dangerous to bathers. Such is the *hydrocion*, which, though no bigger than the sardine, rushes in such numbers and with such ferocity on its prey that instant flight alone can save swimmers from being torn to pieces alive. Other species, which elsewhere serve as food for the coast peoples, are highly poisonous in the Trinidad waters. One of these, a species of shad (*clupea alosa*), is said to be so fatal that people have been known to be struck dead, as if by a stroke of lightning, before swallowing a whole mouthful.* One denizen of the Gulf of Paria emits musical notes, or buzzing sounds, like the maigres (*sciæna aquila*) of the Mediterranean.

Trinidad was colonised by quadrupeds from the mainland before the opening of the Serpent's Mouth, which is of relatively recent origin. There are three species of simians, some small felines, a deer of extremely gentle disposition, and several other mammals. Kingsley tells us that epidemics of small-pox and cholera have been as fatal to the monkeys as to man himself.

Inhabitants.

The only result of the first Spanish settlement, dating from the close of the sixteenth century, was to hasten the extermination of the aborigines. The Jayos (Yaos) and Nepoyos, members of the Arawak or Carib families, were

* Ch. Kingsley, *op. cit.*

formerly numerous; but they were hunted down and shipped as slaves to Española and other islands, to work in the mines or on the plantations. Soon the greater part of Trinidad was changed to a solitude, all the aborigines having perished, except a few small groups in the upland valleys of the north. In 1783, two hundred years after the Conquest, a census of the island returned only 2,032 Indians, and these had been reduced to 1,467 by the year 1807. At present a few families of these peaceful aborigines still survive in the neighbourhood of Arima, at the foot of the mountains, where they eke out a wretched existence by making baskets of reeds or foliage, and manufacturing other small articles. Even these are half-breeds crossed with Spaniards, and especially with runaway negroes. Till recently some naked Indians arrived once a year from the Orinoco delta, landed silently at San Fernando, and donning the slight costume required by the police regulations, passed through the town to make their annual collection of fruits and roots in the neighbouring forests. Then they returned as silently as when they arrived, re-embarked, and rapidly disappeared, paddling their canoes across the gulf towards the mainland.

The first Spanish settlers having been nearly exterminated by the English, French, Dutch, and Pichilingue corsairs, the island remained for about two centuries unoccupied, except by a few planters, who had established themselves on the west coast. In 1783 there were only 126 whites, and 605 black slaves or freedmen; including the Indians the whole population fell short of 3,000 souls. It was at this time that the adventurer, Roume de Saint-Laurent, a native of Grenada, succeeded in obtaining from the Madrid Government the repeal of the laws interdicting all foreigners from entering the Spanish possessions. Roman Catholics were even invited to settle in the island, the Government undertaking to protect them for five years against prosecution for any debts previously contracted. Roume de Saint-Laurent hastened forthwith to engage colonists in France and in the Antilles, and six years after the issue of the edict from Madrid the colony had already 2,150 whites and nearly 4,500 free people of colour, who had brought with them over 10,000 slaves.

Breaking with the national traditions of intolerance, Governor Chacon prevented the introduction of the Inquisition, and interdicted the establishment of monasteries. No settler was molested for his religious or philosophic opinions, and during the troubles at the close of the century the planters from the French islands were able to take refuge without let or hindrance in the Spanish colony. In 1787 Picot de Lapérouse erected the first sugar refinery, and ten years later there had sprung up 159 others, besides 300 "habitations," where coffee, cotton, and cacao were cultivated.

Since that time Trinidad has steadily increased in population and wealth, even during the wars which resulted in the British conquest. As in most of the Antilles, the bulk of the inhabitants are negroes and half-breeds, descendants, like their former owners, of immigrants from the other islands, and speaking the French creole patois. This is an extremely soft idiom of highly simplified

structure, though still possessing its own grammatical and euphonic laws. The Trinidad dialect, which has been studied by Thomas, a native of colour, possesses quite a literature, consisting, like the Martinique and Haiti varieties, especially of wise sayings and proverbs.

Nevertheless, there can be no doubt that in the near future the numerical preponderance will cease to belong to these French or Gallicised ethnical elements. A large number of extensive plantations and of the agricultural factories have

Fig. 21.—Wife of a Rich Hindu Coolie.

already changed hands, having been purchased from their former owners by English and Scotch settlers. The latter have the reputation of being very grasping, as illustrated by the local expression, "Scotch friend," applied to the murderous lianas which entangle the trees in their deadly coils. Under analogous influences, negroes of English speech from Barbadoes and other islands are continually replacing the French blacks, and driving them to the interior. The latter, rejoicing in their emancipation, and naturally anxious to take advantage of

the changed relations, have nearly all abandoned the plantations, and now cultivate their own little plots, which yield enough for all their wants. There exist over 20,000 such small holdings, belonging, for the most part, to these Africans.

But the great landowners, deprived of the slaves who formerly garnered their crops, have had to replace them by hands procured through agents from the Far East. So early as the year 1800 some traders had already introduced from Macao about a hundred Chinese, amongst whom was a solitary woman; at present these "Celestials" are estimated at some 3,000, many of whom have in their turn abandoned the large plantations, and taken either to petty dealings or to cultivating small plots on their own account.

Since the year 1845 the imported labourers are nearly all Hindus, engaged directly by speculators, who are subsidised by the colonial government to the extent of about £80,000 a year. The coolies, almost exclusively from Bengal, are engaged according to the season, to the number of 2,000 or 3,000, for a term of five years, after which they have the right of a free passage home. All but 700 or 800 remain in the island, where they contribute with the negroes to increase the class of small freeholders. Some even return from their Asiatic homes, and settle in Trinidad with their families and friends. Thus the traveller may here recognise the natives as well as the scenery of India in the coconut-groves of the east and west coasts. The effect is heightened by the gay banners fluttering from tall bamboos to indicate from a distance the Hindu temples, where the devotees come to make their floral offerings.

The coolies, who at present form a third of the population, generally keep aloof, contracting no alliances either with the whites or the blacks. Nevertheless, there have already sprung up some fine types of Eurasians, a class daily acquiring an increasingly important position in Trinidad society.* The Sivaites, forming the majority of the Hindus, live on bad terms with the Mohammedans, and sanguinary conflicts have even taken place between the votaries of the rival religions. Nearly all their savings are spent by the coolies in the purchase of jewellery for their wives, which in case of divorce gives rise to much wrangling and lawsuits.

Agricultural Resources.—Topography.

In his work on the Orinoco regions, published in 1727, the Jesuit Gumilla informs his readers that the soil of Trinidad had been condemned to perpetual sterility ever since the first settlers had refused to pay the tithes. Nevertheless, the fecundity of the island has been amply vindicated by its white, black and yellow cultivators. Although scarcely one-eighth of the land has been reclaimed, the foreign trade, consisting chiefly of sugar, molasses and cacao, has long exceeded £4,000,000, while the local traffic in fruits, vegetables and other provisions is increasing still more rapidly.

Nearly all the coffee-grounds have been abandoned, and tobacco also is now

* F. H. Hart, *Trinidad.*

but little grown, although the leaf is scarcely inferior to that of Cuba. One of the most costly operations on the plantations is the uprooting of the para-grass, which, although yielding an excellent fodder, grows with a vigour that threatens to stifle the more valuable sugar-cane. Most of the agricultural and commercial life of the island is centred on the west coast, where are situated the two largest towns, now connected by a railway and by a regular line of steamers. The east

Fig. 22.—Trinidad.

Scale 1 : 1,300,000.

Depths.

0 to 12 Fathoms. | 12 to 50 Fathoms. | 50 Fathoms and upwards.

30 Miles

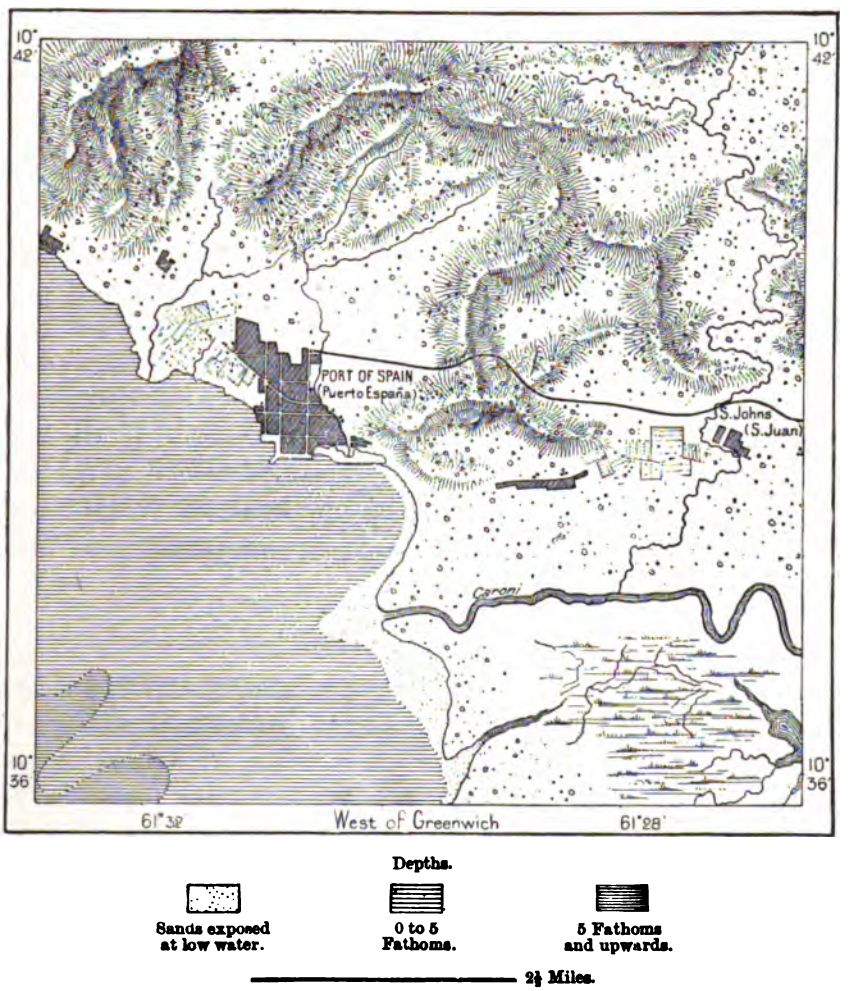
side, facing the Atlantic and the trade winds, is almost a solitude destitute of towns or harbours.

Besides its agricultural and commercial importance, Trinidad has a certain value in the eyes of the restless South American populations, as a place of refuge for political exiles and fugitives from Venezuela and the other Spanish republics. In former times it was also the headquarters of British military operations in the West Indies. Many an expedition was here organised during the wars of independence, and from this station English traders may now command the entrance of the Orinoco, one of the great highways to the interior of the continent.

Trinidad is already the depot for the Venezuelan lands which border the great river, and it might one day take the same position with regard to the Colombian plateaux through the Rio Meta.

Port of Spain (*Puerto España*), usually designated by the simple word "Town," is in truth the largest town, as well as the political capital, of Trinidad.* Yet

Fig. 23.—Port of Spain.
Scale 1 : 115,000.



at a distance it seems lost in the surrounding vegetation. Whole quarters are embowered in verdure, and the shady avenues of the city are continued by fine parklands towards the suburban villas dotted over the slopes of the hills. Till recently water had to be brought by boats from a distance of nearly two miles, but it is now supplied from the little river Maraval by an aqueduct three miles long.

The tranquil roadstead to which the place owes its popularity is well sheltered,

* F. H. Hart, *Trinidad.*

but too shallow for large vessels, which have to ride at anchor some miles from the quays. Despite this drawback, Port of Spain has attracted to itself nearly all the commerce of the island, while splendid natural harbours, such as that of *Chaguaramas*, near the Boca Mono passage at the extremity of the north-west peninsula, are completely deserted. Being surrounded by rocks and swamps, and remote from the cultivated districts, these havens are useless for the purposes of trade. Chaguaramas, sheltered by islets and reefs, is deep enough for the largest vessels, and it was here that the Spanish fleet took refuge in 1797, when Admiral Apodoca delivered it to the flames rather than accept the challenge of an English squadron of equal strength. The Spanish Government preferred to be defeated by its English enemies than defended by its French friends! * During the season thousands of visitors resort to the beach at Chaguaramas, to the neighbouring islets, and to the *Isla dos Monos* ("Monkey Island") in the Dragon's Mouth.

A road and, farther south, the navigable course of the Caroni connect Port of Spain with the old capital, *San Josef* (*San José*), which crowns a rising ground commanding a wide prospect of cultivated lands. Beyond this place a branch of the railway runs east to the village of *Arima*, while the main line runs south to *San Fernando* at the foot of Mount Naparima. As an agricultural centre San Fernando ranks in importance with the capital itself. In the district are situated the richest plantations in the island, and farther inland the villages of *Montserrat* and *Princestown* are surrounded by extremely fertile tracts in the hands of independent farmers, amongst whom are distinguished some Venezuelans of Spanish race.

Administration.

Trinidad, to which its neighbour, Tobago, is administratively attached, forms a British Crown Colony, so that its inhabitants are subjects with scarcely any electoral rights. The Queen appoints the governor, as well as the executive council of three members by whom he is assisted. The legislative assembly, also appointed by the Crown, consists of six *ex-officio* and eight other members. The elective principle, however, is allowed free play in the municipal affairs of the capital and of San Fernando, fifteen members being elected for the town council of the former and seven for that of the latter place.

The only armed forces are about 500 police and the same number of volunteers, who meet from time to time for drill and target practice. The schools, which are frequented by the great majority of the white, Hindu, Chinese, black, and coloured children, partly depend on the Government, which has founded and endowed the secular establishments, while also contributing grants in aid both to the Catholic and Protestant educational establishments. The revenue, large for a still thinly-peopled island, is derived mainly from the customs. There is a public debt of £520,000 (1892), contracted almost exclusively for the railways, which have a total length of 54 miles.

* Dauxion Lavaysse; Kingsley, *op. cit.*

The island is divided into eight administrative districts—Saint George and Saint David in the north; Caroni, Saint Andrews, Victoria and Nariva in the centre; Saint Patrick and Mayaro in the south.

IV.—Margarita and Neighbouring Islets.

Margarita, the "Pearl," one of the islands discovered by Columbus in his voyage of 1498, belongs, like Trinidad, to the Andes orographic system, although not disposed in a line with the Paria range. It develops a parallel chain, indicated by two principal masses, and reappearing some 60 miles farther west in the islet of Tortuga. In fact, Margarita may be regarded as forming two distinct islands—in the east Margarita, properly so called, in the centre of which Mount Copei rises to a height of 4,170 feet; and in the west Macanao, so named from its culminating point, 4,484 feet high.

Although of less extent than Trinidad, Margarita greatly exceeds it in the altitude of its mountains. Between the two sections of the island stretches the so-called Restinga, or Laguna Grande ("Great Lagoon"), which communicates with the gulf on the south side by a shifting channel, while on the north side the two islands are connected by a thin but continuous strip of sands. At its narrowest point this line of dunes is scarcely more than 164 feet wide between the lagoon and the open sea.

Margarita is one of those islands which were first colonised by the Spaniards. In 1499, the very year following the voyage of Columbus, Guerra discovered the pearl-banks of Coche Island off the south coast, and soon after others were reported round the main island and on the coast of the islet of Cubagua (Cuagua), which immediately attracted numerous adventurers. In 1525 a fort had already been erected on Margarita; it did not, however, prevent the capture and plunder of the island by the dreaded "tyrant," Lopez de Aguirre, in 1561. Then came the English, and in the next century the Dutch.

During the War of Independence the Margaritans took sides with the rebels, for which they were cruelly punished by the Spaniards. This earned for the insular group the official title of Nueva Esparta ("New Sparta") from the grateful republicans of Venezuela after the revolution.

As a whole the island must be regarded as arid, being largely covered with bare rocks, dunes, saline marshes, and even coral reefs formerly built up round the coast. The inhabitants find little room for tillage except in the narrow upland valleys, and their chief resources are fishing and the collection of salt, which, under the name of *sal de espuma* ("foam salt"), is highly appreciated in the trade. The women, who are very industrious, make earthenware and light cotton stuffs, besides hats of a coarse fibre, which are sold at a low price in every part of the republic.

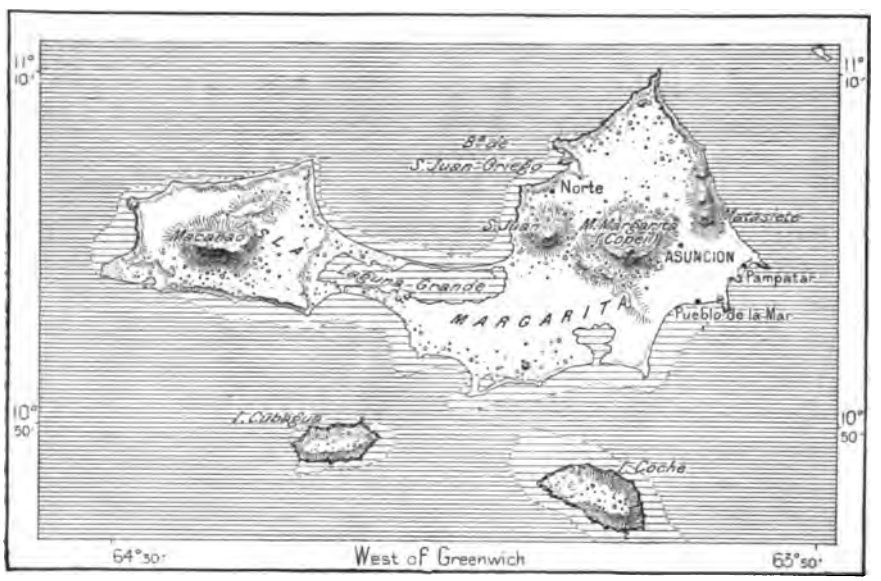
The pearl industry is almost abandoned, nearly all the banks being exhausted, while the pearls themselves have fallen considerably in value. But the fisheries proper are still very productive, that of Coche Island being farmed by the

Government to speculators at a high figure. The fish is largely captured with enormous trawl-nets, each worked by 180 or 200 hands, all members of the Guayqueri tribe. A single haul occasionally represents as much as twenty-five tons of dried fish. During the season, which lasts nine months, a good *chinchorro* (net) should take altogether at least 225 tons. When the line closes round the seething multitudes, hundreds of fishes leap out and fall into the boats which crowd round the periphery. The oil of the sharks and of the other non-edible kinds serves for lighting the houses and varnishing the boats.

Nevertheless, all this marine produce, with the slight resources of the island, are insufficient to support the inhabitants, who consequently emigrate in consider-

Fig. 24.—MARGARITA.

Scale 1 : 800,000.



able numbers to Venezuela. The great majority are half-caste Guayqueri natives, who increase very rapidly. In 1881 they numbered over 37,000, of whom more than 20,000 were women, an enormous disparity due to the emigration of the men to the mainland. In average years the birth-rate far exceeds the mortality in this salubrious island, which attracts consumptive patients from great distances.

The chief centres of population, *Asuncion*, the capital, noted for its miraculous Virgin adorned with a robe of pearls, the two ports of *Pampatar* and *Pueblo de la Mar* (*Porlamar*), and, near the bay of Juan Griego, *Pueblo del Norte*, have all been founded in the eastern part of the island. *Nueva Cadiz*, founded in Cubagua

Island so early as the year 1515, and consequently the oldest of all Spanish settlements in South America, was abandoned when the neighbouring pearl fisheries ceased to be productive.

East of Margarita the little group of the Testigos ("Witnesses") recalls the presence of a formidable pirate of the first years of the eighteenth century, Captain Teach, the "Bluebeard" of West Indian legends. Frequent attempts have been made to recover his treasures, said to have been buried "three hundred paces" from a certain point in the chief island of the group.

Tortuga, farther west, is occupied by a small village and encircled by a cortège of Tortuguillos ("Little Turtle Reefs"). Blanquilla in the north, as indicated by its name, is an expanse of whitish sands and rocks with a stunted vegetation of cactuses and mimosas. A few depressions here and there have enough vegetable humus to repay cultivation. During the wars of the Revolution a planter from Guadaloupe established himself with his slaves in Blanquilla, where he wanted to set up a cotton-mill. But the Spanish Government expelled the intruders, and restored this remote land to solitude, to its wild oxen and packs of runaway dogs.

V.—The Leeward Islands.—From Orchilla to Aruba.

These islands, which run first west and then north-west in continuation of the eastern chain beginning with Blanquilla, develop an extremely regular curve parallel with the Venezuelan coast; each member of the group even affects a trend identical with that of the opposite mainland. All represent the upraised summits of a submarine ridge belonging like Margarita to the Andes system, but rising to a much lower elevation above sea-level. The culminating crest of Orchilla is only 400 feet high, while Sanct Christoffel, highest summit in Curaçao and in the whole chain, scarcely exceeds 1,200 feet.

On the other hand the islands have been enlarged horizontally by the coral-builders. The Los Roques cluster, which abuts south-eastwards on a rock 150 feet high, has its reefs rising here and there above the surface disposed in circular form like the atolls of the Indian Ocean. The neighbouring Aves (Bird Islands) are also of coralline origin, whereas Aruba (Oruba), in the extreme west, presents a nucleus of largely disintegrated syenite and granite, whose detritus forms the soil of the island, itself encircled by a broad fringe of coralline limestone.

The eastern islets and reefs, Orchilla, Los Roques, and Aves, are uninhabitable rocks visited only by fishermen and lighthouse-keepers. After the Revolution they were left politically dependent on Venezuela, while the three western islands of Buen Aire, Curaçao, and Aruba, all of relatively large size and cultivable, had long previously been detached from Spain.

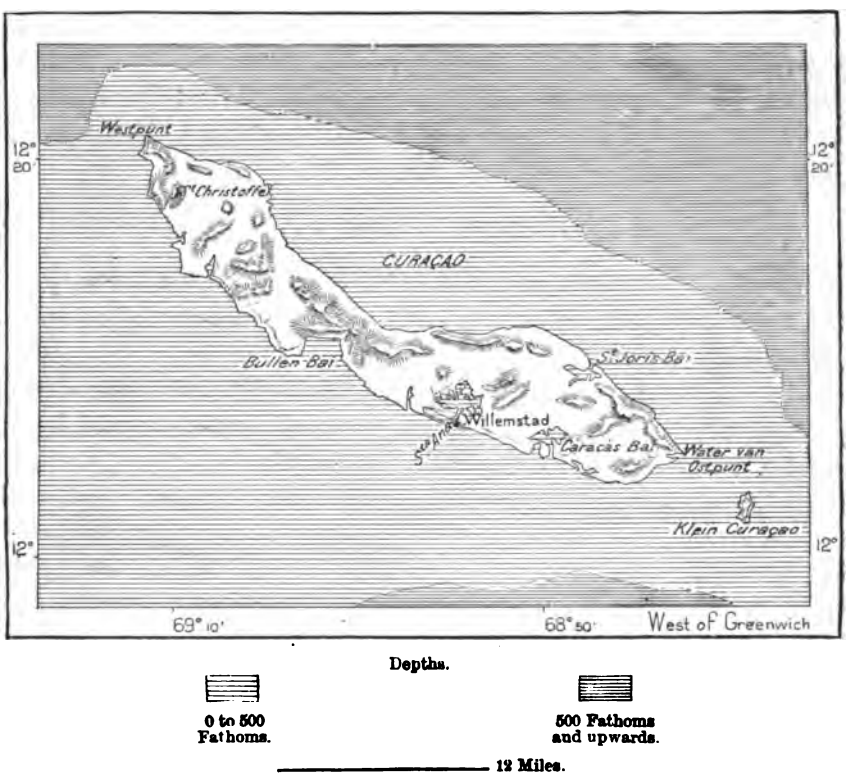
Curaçao.

In 1499 Hojeda had already discovered Curaçao, which he called the "Isle of Giants." It was occupied to the sixteenth century by some Spanish settlers, but

it was seized in 1632 by the Dutch, who remained masters of the archipelago till the wars of the Empire, when it was temporarily occupied by the English and restored to Holland in 1814. Despite its small extent and scanty population, this colony is highly valued by its possessors on account of the deep and well-sheltered harbour on the south coast of Curaçao. At the time of the conquest by the Dutch traders Curaçao was still inhabited by a tribe of about 500 aborigines, who are said to have accompanied the Spanish settlers to the mainland.

Willemstad, capital of the colony, lies on the east side of the harbour, which is still often designated by its old Spanish name of *Santa Ana*. The capital itself is

Fig. 25.—Curaçao.
Scale 1 : 700,000.

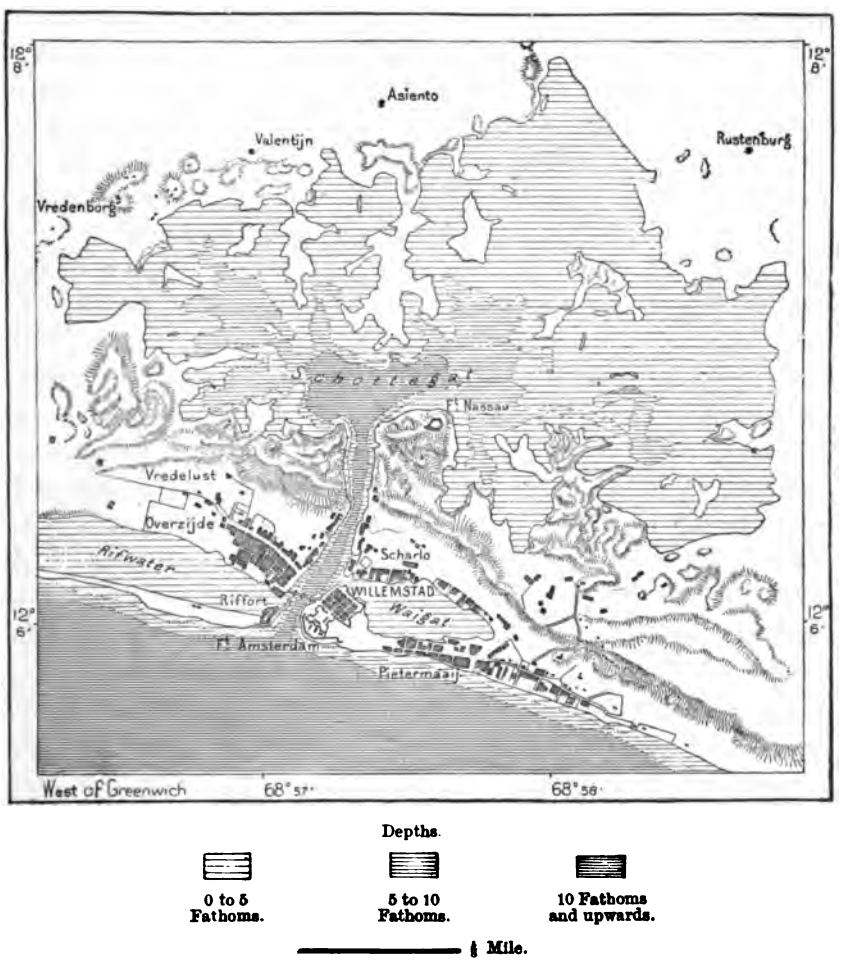


better known by the name of Curaçao, which is that of the whole island. The houses are built in a style resembling that of Amsterdam as far as was possible under the conditions required by a tropical climate. In the passage separating it from the western suburb of *Overzijde* ("Overside"), and in the swampy waters ramifying inland, Willemstad also presents the aspect of a Dutch town. The quays are everywhere crowded with shipping, while men-of-war ride at anchor in the Schottegat, a deep lagoon forming a northern extension of the harbour. A bridge of boats connects the capital with its suburb just above two forts guarding the entrance to the basin, which is accessible to the largest vessels through a channel 6 to 10 fathoms deep.

GENERAL VIEW OF WILLEMSTED (SANTA ANA DE CURAÇAO).

Like those of Buen Aire the plains of Curaçao are largely occupied by arid wastes. Nevertheless, some sugar, tobacco, fruits, and vegetables are raised for the export trade in a few glens, some naturally fertile, others rendered productive by much patient labour. The Willemstad traders also forward phosphate of lime obtained in Klein Curaçao, a rocky islet near Buen Aire. Other products of the colony are the seeds of the *dividivi*-tree, used for tanning, and considerable quan-

Fig. 26.—WILLEMSTAD.
Scale 1 : 48,000.



tities of salt, till recently procured by natural evaporation alone, but now more rapidly crystallised by artificial processes.

But the local traffic is of small account compared with the transit trade with the Venezuelan mainland, to which Willemstad is mainly indebted for its commercial prosperity. Here the Colombian and Venezuelan shippers obtain the vessels and crews engaged in the coasting trade, as well as the advances required to carry on their operations. The Jewish and Christian bankers of Curaçao are amongst the principal creditors of the Hispano-American speculators. Like Trinidad, the

Dutch island has also long served as a place of refuge and a centre of political intrigue for the exiles and conspirators of the neighbouring republics. Willemstad is also a sort of linguistic capital, for here more than elsewhere is current the so-called *papamiento* (*papimiento*), a curious lingua franca composed of Spanish, Dutch, English, and native (Aruba and Goajira) elements. It even contains some Portuguese words, the presence of which is difficult to explain, the Portuguese never having navigated these waters.

Aruba.

Aruba, westernmost member of the group, formerly bore the name of Azua, from a shrub very common in the locality. It is the best cultivated of the three Dutch islands, although suffering from a want of water, which has to be husbanded in cisterns or drawn from tidal wells sunk in the sands. Now seldom visited by travellers, Aruba is, nevertheless, the most interesting island in the archipelago from the archæological point of view. Here are found many stone and clay objects, besides rock inscriptions of Indian origin. The earthenware is almost invariably embellished with little figures representing frogs' or owls' heads. The inscriptions, painted in various colours, but never carved, differ little from those occurring in many places on the mainland.*

The aborigines, all half-breeds, have preserved nothing of their native language except certain forms of incantation and medical recipes. Till recently they deposited their dead in large cone-shaped vessels, which were buried under little barrows. The Spanish conquerors found in Aruba a populous city abounding in the precious metals, which gave rise to the whimsical and evidently erroneous etymology of the name Aruba (Oruba): *Oro hubo!* "Here was gold!" At present only faint traces of the precious metals can be detected in the rocks of the island. According to the geologist Martin, Aruba was the last member of the Leeward group to be separated from the mainland. Here are still seen some species of animals which have disappeared from Buen Aire and Curaçao; such especially are a species of parrokeet, a frog, and a rattlesnake. In recent times indications have been observed of an upheaval of the coasts.

* Alph. Pinart, *Exploration de Curaçao et d'Aruba.*

CHAPTER III.

VENEZUELA.

I.

THIS Hispano-American state appears, like the New World itself, to have acquired its name in a haphazard sort of way, perhaps from an incident connected with the voyage of Amerigo Vespucci. In 1499, when Hojeda, in company with the Florentine, penetrated for the first time into the inland sea or "lagoon" of Coquibacoa, now called Maracaibo, he noticed on the east side a group of some twenty cabins erected on piles, surrounded by "gondolas," and communicating with each other by crazy drawbridges. The little lacustrine town, mirrored in the still waters of the lagoon, seemed to the travellers like a "Venezuela" or "Little Venice," and it may be presumed that Vespucci, as an Italian, was not the less struck by the resemblance.

The name thus casually given to the cluster of huts gradually extended to the surrounding shores, where pile dwellings were at that time very numerous, and then to the whole region. It thus eventually replaced the expression, *Costa Ferma* ("Main Shore"), originally applied to all the seaboard between the Orinoco delta and Lake Maracaibo, in opposition to the islands which had been the scene of the first Spanish explorations. Before the proclamation of independence the province of Caracas had already been officially called Venezuela, the political meaning of which, as now clearly understood, corresponds to the whole space enclosed by the frontiers of Colombia, Brazil, and British Guiana.

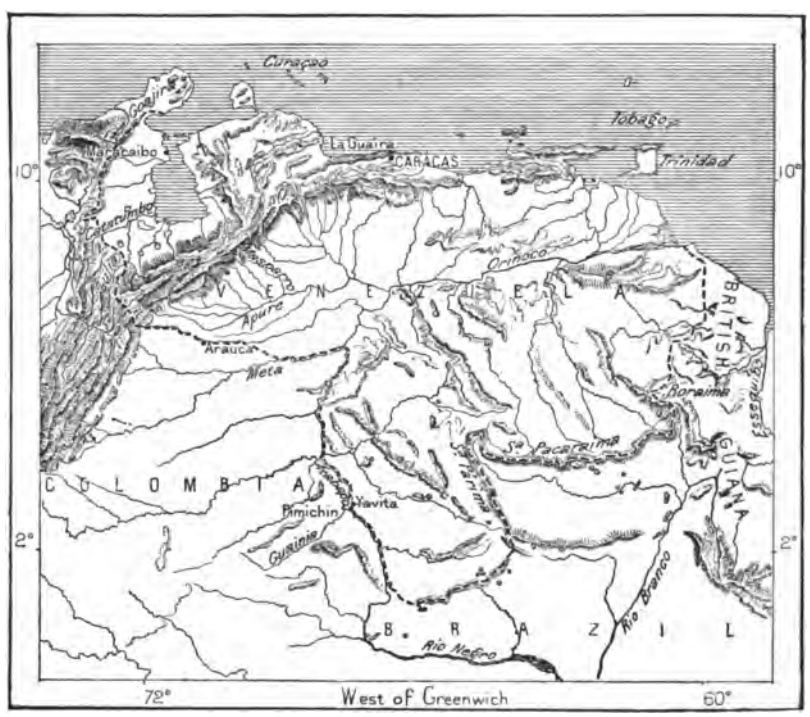
Disputed Frontiers.

But these limits were far from being determined all along the line; hence the impossibility of estimating even approximately the probable extent of Venezuela, while vast territories were still being claimed by one or other of the conterminous states. Since 1891 the frontier question towards Colombia has been settled by Spain, to which the matter had been referred. Aided by the numerous documents preserved in the national archives, the Spanish arbitrators were able to pronounce an official verdict substantially in favour of Colombia. Thus the Goajira district was assigned to the western state; if not altogether, at least from

some islets on the coast of the Gulf of Venezuela, along a line running through the Montes de Oca forest to the Sierra de Perijaa east of the Rio Cesar valley. Colombia also keeps the disputed territory of San Faustino in the Rio Zulia valley, as well as the left bank of the Orinoco, between the Meta and Guaviare confluences; the Atabapo frontier to a distance of 22 miles above Yavita, then a straight line running towards the Guainia (Rio Negro) to 22 miles west of Pimichin, and lastly the Guainia itself to Cucuhy on the Brazilian frontier.

In the territory thus awarded to Colombia, Venezuela preserves nothing but the right of way turning the Atures rapids within the Colombian frontier. She loses altogether nearly a third of the space claimed, though the region in dispute

Fig. 27.—Frontiers of Venezuela.
Scale 1 : 18,000,000.



is but sparsely inhabited and of no present economic value. Colombia had, on the other hand, demanded much more than she received, claiming the Cassiquiare and the Baria and Canaburi affluents of the Rio Negro for her eastern frontier.

Towards Brazil the Venezuelan frontier, as determined by the treaty of 1859, runs from above the village of Cocui, at first south-east until it coincides with the waterparting between the two secondary basins of the Baria and Canaburi, and beyond it with the divides of the Rio Negro, of its great affluent the Rio Branco, and of the upper Orinoco. Beyond Mount Machiari, northern limit of the Sierra Parima, which forms part of the dividing line, the frontier turns abruptly south and then nearly due east along the crest of the Sierra Pacaraima between the

lower Orinoco and the Rio Branco basins. At the eastern extremity of the Pacaraima range Mount Roraima forms the present corner-stone where converge the frontiers of Venezuela, Brazil, and British Guiana.

Nevertheless, the boundaries farther east are still in dispute. Here the English occupy, besides the Essequibo basin and part of the Orinoco basin, a vast region some 36,000 square miles in extent, which is claimed by the Venezuelans as part of their domain. But the British Government and the settlers in Guiana value its possession all the more that it is conterminous with the Venezuelan goldfields of the upper Cuyuni, and also contains auriferous deposits itself.

In the direction of the north-west the English have extended their acquisitions as far as the mouth of the Orinoco. Here the Amacuro river and the channel separating Barima Island from the mainland may be regarded as already forming part of the great delta. Thanks to this position at the entrance of the Orinoco, Great Britain may hope some day to acquire the political and commercial supremacy in the whole of the delta region, facing which is the important military and trading station of Trinidad.

Since the days of Walter Raleigh, England has several times attempted to penetrate into the interior of the continent through this gateway. In the "Archives of the Indies" there exists a Spanish map, dated 1591, on which figures a large island in the middle of the delta with the legend: "Aqui estan los Ingleses," that is, "Here are the English." In 1808 the British Government occupied various points of the delta, where its farthest station, standing on a height between the Orinoco branches and the Guarapiche river, commanded both the entrance of the navigable channels and of the Serpent's Mouth. This strategic point was even spoken of as a future "Gibraltar," and although it has since been abandoned, the Venezuelans want also to recover Barima Island and all the coastlands as far as Maruca, near Cape Nassau. They are also anxious to secure their goldfields on the Cuyuni river from any risk of annexation. But they can hardly hope for success in a diplomatic struggle with Great Britain. They might no doubt easily obtain the good offices of the United States, but are afraid of the danger of a protectorate, powerful allies often exacting too high a price for their services. England has hitherto declined to submit the question to arbitration.*

Extent—Population—Cartography.

Within the actual limits recognised by Colombia and Great Britain, Venezuela still comprises an enormous territory out of all proportion to its scanty population. The superficial area was approximately estimated in 1893 at about 530,000 square miles, occupied by scarcely 2,200,000 inhabitants. The greater part of the territory, a wilderness roamed by a few scattered wild tribes, is still an almost unknown region from the geographical point of view. Certain tracts bordering on British Guiana, and more especially those conterminous with Brazil,

* And will continue to do so until Venezuela withdraws her claim to the Barima district, and gives up some other utterly preposterous demands.—Ed.

have been traversed only in a few directions, and are figured on the maps mainly from native reports and the more or less shrewd conjectures of a small number of explorers.

Codazzi's map, published in Paris over half a century ago, still remains the chief cartographic document available for the study of Venezuela. It has, however, been rectified and supplemented in many of its details, thanks especially to the marine surveys, by which the astronomic positions of the seaports, headlands, and adjacent islands have been determined, while the contour-lines of the whole seaboard, shifted by Codazzi a little too far west, have been restored to their proper position.

In the interior, scientific observers, such as Sievers, have also corrected Codazzi's surveys, about Lake Ticaragua, in the Merida and Tachira districts, and along the Colombian frontiers. The map has also been improved in many important particulars by the general progress of settlement, mining enterprise and railway undertakings. But the whole work requires to be thoroughly recast.

The War of Independence.

The insurrection which resulted in Venezuelan independence broke out in 1810. More than once the patriotic party seemed on the point of being crushed, and the cause of the revolution was seriously endangered by the earthquake which destroyed Caracas in 1812. The indirect consequences of this disaster were even more deplorable than the catastrophe itself. It certainly prolonged the ruinous war probably for years, and greatly intensified its horrors. The event having taken place on Holy Thursday, the first anniversary of the declaration of independence, the priests, nearly all of whom belonged to the Spanish party, declared that the hand of God had wrought the ruin in order to crush the revolution. Most of the towns besieged by the Spaniards fell into their hands, and Miranda, general-in-chief of the insurgents, capitulated, leaving the remains of Caracas to its old masters.

But the revolution broke out again, thanks especially to foreign aid. Owing to its geographical position in relative proximity to the Antilles, North America and Europe, Venezuela received more volunteers from abroad than any of the other revolted provinces. As many as 9,000 English, Americans, and French are said to have served in her armies, besides about 1,000 blacks from Haiti. But the same geographical position also facilitated the landing of Spanish troops. The issue might have been long retarded but for the action of the *llaneros* (the "cowboys" of the llanos), who at a critical moment joined the revolution, and under their leader, Paez, introduced a system of guerilla tactics against which the resources of regular warfare proved ineffectual. After eleven years of incessant struggles the battle of Carabobo put an end to the Spanish dominion, and the former "capitaneria" of Caracas became an integral part of the great republic of Colombia, which also included Ecuador and New Grenada. In the collective work of South American emancipation the merit of final success was largely attributed to the Venezuelan general and diplomatist, Simon Bolivar.

Every town in Venezuela has perpetuated the memory of the "Liberator" by naming some street or square or erecting some public monument in his honour.

II.

The upland regions round which the Orinoco describes a vast semicircle were undoubtedly at some former period connected with the Andes orographic system. But after the waters of the great lakes had been discharged through the mainstream into the Atlantic, the intervening rocks were gradually eaten away, and the incessant work of erosion, combined with the deposit of the alluvial matter, at last effaced all apparent cohesion, even obliterating the former direction of the connecting ridges.

The Venezuelan Uplands.

But in any case these eastern mountains form no well-defined chain in Venezuela. The whole land rises bodily in such a way as to form a sort of shield or convex tableland, above which are developed broad anticlinal foldings abutting in all directions on ramparts of unequal size, some sloping gently, some presenting sharp escarpments bristling with peaks and needles, while the whole system is here and there interrupted by upland plains affecting the form of cirques. The whole of this rugged region has received the name of Parima, either in memory of the mythical lake of the "Great Water," or from the Parima said to have been formerly inhabited by the Dorado, or "Golden Man," who dwelt in a palace of carbuncles and of the precious metals so long sought for by Walter Raleigh and so many adventurers.

The sierra, which geographers commonly regard as the backbone of the system, and in which the Orinoco and the main branch of the Rio Branco have their source, is one of its least-known sections. Even the members of the commission appointed to lay down the frontiers between Venezuela and Brazil did not venture to traverse it during their exploring expedition of 1880-3. From the disconnected reports of a few travellers it may be inferred that the main axis consists of sandstone strata resting on a granitic base. The highest crests probably exceed 6,500 feet, although Chaffanjon, who ascended the Orinoco to its source, estimates the altitude of the surrounding mountains at not more than from 4,000 to 4,650 feet.

In Venezuelan Guiana the northern continuation of this water-parting takes various names, such as the Sierra Maigualida, towards the sources of the Ventuari, and the Sierra de Matos, between the Cuchivero and Caura valleys. In this part of the chain, which here already approaches the Orinoco, the Cerro de Mato, measured by Codazzi, attains a height of 6,135 feet. To this system of the Parima uplands belong the granite hills of Caicara at the great bend of the Orinoco, near the Apure confluence, as do also the Cabruta cliffs on the opposite side. Here the river forces a passage through the chain instead of sweeping round to the north.

On the maps of Venezuela the expression Sierra de Parima is also applied to the

irregular ranges which skirt the right bank of the middle Orinoco along its great bend. Here is situated the famous Cerro Duida (7,125 feet), a wooded pyramid which is visible for an immense distance along the mainstream, and which dominates the ramifying waters between the Orinoco and the Cassiquiare. It has been called a volcano from the flitting flames often seen dancing above its forest-clad slopes, although, from the descriptions of the natives, these flames would seem to be merely will-o'-the-wisps.

Duida is overtopped by Mount Maraguaca (Maravaca), which rises farther inland to a height of 8,230 feet, while Maparana and the Cerro de Neiva in the north-west are respectively 7,180 and 6,030 feet high. Beyond the deep valley of the Rio Ventuari occur other lofty peaks, such as the Yamari (7,420), and the Cunavana (6,180), besides various mountains whose spurs rise in towers, steps, or abrupt slopes above the Orinoco. To the same orographic system also belong a few isolated eminences scattered over the llanos on the west side of the river. Of these the highest is the peak of Uniana (1,900 feet), which is connected with the uplands on the opposite side by the granitic Atures reefs, over which the Orinoco descends in a series of rapids. Viewed as a whole, the mountains of the Parima system are distinguished by their relative isolation and broken character; they rise in the midst of the plains or of the lower grounds, without presenting any well-defined continuous ridges.

In the section of Venezuela comprised between the Orinoco, the Caura valley, and the divide towards Guiana the country is everywhere hilly, and here and there presents a few summits exceeding 3,000 feet in height. Such are Chanaro (5,480 feet), Turagua (6,000), and Tacuto (3,440), all rising above the east side of the Caura valley. The other crests of Venezuelan Guiana, which are disposed in the direction from south-east to north-west in a line with the axis of the Sierra Parima, scarcely anywhere exceed 3,000 feet, except at the converging point of the Orinoco, Amazons, and Essequibo basins, where Roraima, one of the great summits of the Guiana region, attains an altitude of 7,400 feet. Although not penetrating into the aerial zone of snows and glaciers, no mountain presents a more formidable aspect. It forms an enormous mass of pink sandstone rising sheer above a vast region of terraces and verdant valleys. Its vertical walls, averaging about 1,600 feet, are everywhere flanked at their base by accumulated masses of débris, forming a long talus, which encloses the perpendicular upper cliffs on all sides. Seen from below, the topmost platform of this frowning fortress, some three or four miles in extent, seems to be perfectly level, although in reality strewn with huge boulders resulting from the disintegration of the older strata.

Other mountains in the district present a somewhat similar aspect, though on a much smaller scale, and one of them, the "Crystal Mountain," is strewn with crystalline quartz, all that now remains of vanished rocks. Obviously Roraima was formerly part of an elevated tableland, which has been gradually isolated by a process of cleavage and erosive action. It survives to present times as a superb witness to former geological conditions. Streams have their rise on the upper platform, over the edge of which they fall in cascades, draping the pink escarp-

ments as with lace veils of their silvery spray. "O Roraima, red mountain, wrapped in clouds, fruitful mother of streams!" sing the Arecuna Indians, encamped in the surrounding valleys.

These tremendous cliffs were for the first time scaled by Im Thurn and Perkins in 1884, and since then the summit has been visited by the collectors of orchids, Mr. E. Cromer and Mr. Seyler, the former alone in 1888, and both together in 1891. On the last occasion the surface was explored, and towards the south many gigantic and marvellously-shaped rocks discovered, resembling majestic palaces, churches, and fortresses. Other smaller rocks assumed the fantastic forms of umbrellas, kettles, or pyramids, and one bore a striking likeness to the statue of a man Between these grotesque masses of rocks were innumerable lakelets, some connected by canals generally shallow, but occasionally 5 or 6 feet deep. The plateau seemed almost destitute of animal life, though the lakes, one of which was 150 yards wide, swarmed with a species of blackbeetle. Some small frogs and lizards, a few spiders, and one black butterfly were also seen, besides a small dark-coloured mammal, apparently a species of kibihee (*Nasua fusca?*), which when approached gave a sound like a whistle and swiftly disappeared amid the rocks.*

The Venezuelan Andes.

In Venezuela the Andes proper begin on the very shores of the Dragon's Mouth over against the north-west point of Trinidad, whence the Paria range runs westwards, with perfect regularity, but at a moderate elevation. Nevertheless, a crest at the eastern extremity overtops the highest peaks in Trinidad, attaining an altitude of 3,510 feet. The system, which is entirely of igneous origin, extends for a distance of about 160 miles, being limited southwards first by an inlet of the Gulf of Paria, and farther west by the Gulf of Cariaco. Between these two deep bights it skirts a low-lying plain, where is seen a still flooded depression, remnant of a former marine inlet. This level tract, which is watered by a few sluggish streamlets, may one day serve to connect the two opposite gulfs which it now separates.

Even to the most ignorant observer of the physical aspects of nature, the Gulf of Cariaco presents the unmistakable appearance of a mountain valley skirted by two parallel ranges. It looks, in fact, like a rent in the mountains, so accurate is the correspondence between the headlands and inlets along its northern and southern shores. Hence the local Indian legends speak of a sudden irruption of the sea, which, according to some chroniclers, occurred only a few years before the voyage of Columbus. The Paria range itself is pierced by a transverse breach south of the picturesque bay of Carupano.

The mountains of Cumana, which rise to the south of the Paria chain, present a far less regular aspect, developing a line of uneven masses disposed in the same direction from east to west, and dominated by summits much higher than those of the coast range. Mount Turumiquire, towards the centre of the system, attains a

* *Proceedings of the Royal Geographical Society*, April, 1892, p. 242.

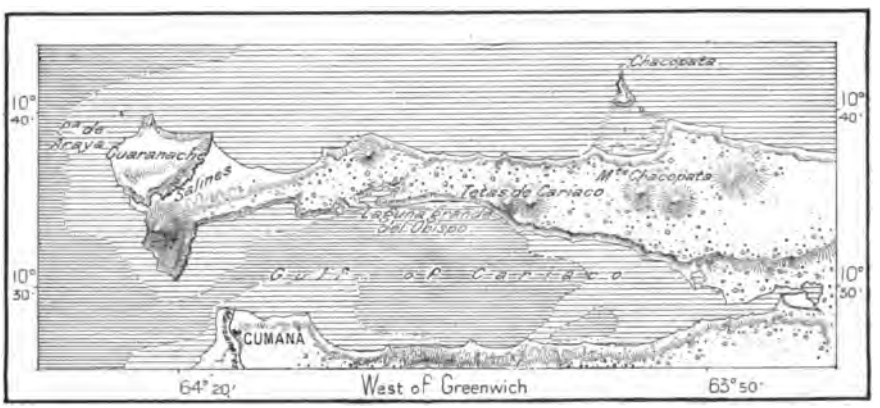
height of 6,730 feet, while Mount Bergantin, towards the western extremity of the cordillera, rises 5,480 feet above the surrounding plain.

Consisting of metamorphic rocks, schists, limestones, and sandstones, overlaid round their periphery by cretaceous deposits, the Cumana mountains have become famous for their vast caverns, tenanted by myriads of birds which have acquired the habits of bats. The entrance to these galleries is half concealed by festoons of lianas and dense foliage.

Eastwards the system is abruptly arrested by the alluvial lands of the Orinoco, while the roots of the mountains disappear towards the south and west beneath the almost horizontal strata of the llanos. Here, therefore, the range is completely interrupted, nor does any eminence appear above the level surface west of the Rio Aragua, as far as the more copious Rio Unare, whose delta encloses the

Fig. 28.—Gulf of Cariaco.

Scale 1 : 800,000.



isolated Morro Unare, some 3,400 feet high. But farther on the mountains reappear, developing, as in the east, two parallel cordilleras, a coast and an inland range disposed in the normal direction from east to west. But here the coast chain is the higher of the two; it often takes the name of the Cordillera de la Silla, from one of its conspicuous peaks.

This range, which begins abruptly at Cape Codera, evidently forms a continuation of the Paria and Cariaco mountains, and consists of gneiss, mica schists, and metamorphic rocks. It runs close to the shore with scarcely any intervening beach, so that its precipitous seaward escarpments can only be ascended by zigzag and devious tracks. Between Guaira, at its northern base, and Caracas, on the southern slope, the crest maintains a mean altitude of 5,250 feet, culminating in the Naiguata peak (9,130 feet), a gneiss crag veined with quartz, supposed to be inaccessible until ascended for the first time by Spence and Ernst in 1876.

Although, according to Aveledo, 380 feet lower than Naiguata, the Silla ("Saddle") is much better known, and has been far more frequently scaled, thanks to its proximity to the capital. A difficult track, which is now abandoned, formerly led from Caracas over the "saddle-back" down to the harbour. The second or southern chain, dominated by the Rincon del Valle, scarcely attains half the elevation of the coast range. It culminates eastwards in a peak 4,200 feet high.

Towards the point where the coast begins to trend northwards round the crescent-shaped Gulf of Triste, the main axis of the system strikes south-westwards, and here is developed the first section of the cordilleras to which, in the popular language, is exclusively applied the name of "Andes." But the space thus shut off between the Gulf of Triste and Lake Maracaibo is itself traversed by somewhat irregular ridges, mainly disposed in the direction from south-west to north-east, parallel with the Andean range itself. Here also crystalline rocks crop out above more recent formations, and the highest peak, the Cerro San Luis, rising 4,000 feet above the south side of the Gulf of Coro, consists of limestones and argillaceous schists. The neighbouring Paraguana peninsula, connected by a tongue of shifting sandhills with the mainland, is also traversed by several rocky ridges, all running in the normal north-easterly direction. Here the highest point is the isolated peak of Santa Ana (1,310 feet).

The Sierra de Merida.

That section of the Venezuelan Andes which is known as the Cordillera de Merida is limited north-eastwards by a ridge 1,200 feet high, forming a divide between the Yaracui basin and that of the Cojedes, which flows through the Rio Portuguesa and the Apure to the Orinoco. Sievers even tries to show that this gap completely separates the two orographic systems, the "Andes" on the west, and the "Carib Mountains" on the east, and according to this geologist the Venezuelan coast ranges should be regarded as belonging rather to the West Indian than to the Andes orographic system.* It cannot be denied that great contrasts exist between the Carib Mountains and the Andes properly so-called, and the former would appear to be far the older and more decayed of the two. Nevertheless, from the orographic standpoint they form a direct prolongation of the Colombian Andes, and the two systems present the same parallelism in the disposition of their crests, with intermediate groups and spurs occurring at intervals, and with the same cretaceous strata overlying the crystalline core.

Of all the Venezuelan chains the Merida range alone has earned the name of Nevada, the "Snowy." Several of its peaks rise to 13,000 feet, while the five loftiest summits penetrate high above the snow-line. The Concha and Coluna peaks, specially designated as "snowy," attain a height of 15,420 feet, and a small glacier even descends from Concha, yielding a constant supply of ice to the inhabitants of Merida. Several parallel ridges, consisting for the most part of crystalline rocks and old schists, are connected together by oblique offshoots, the

* W. Sievers, *Venezuela. Die Cordillere von Mérida*, Geographische Abhandlungen, von Albrecht Penck, III., i., 1888.

central nucleus of Mucuchies rising to an altitude of 13,520 feet. All the upland valleys between the crests, standing at an elevation of over 11,500 feet, have assumed the aspect of *paramos*, that is, of irregular treeless plateaux clothed with low herbage, mosses and lichens, exposed to the cold winds and icy fogs.

The steepest slopes of this section of the Andes fall northwards down to the plains encircling the shores of Lake Maracaibo. On this side an imposing aspect is presented by the cretaceous cliffs rising abruptly above the fringe of leafy woodlands, streams and morasses. The numerous rivers which have their source in the sierra flow for the most part in a line with the mountain barrier, some descending north-westwards straight to the Maracaibo lagoon, some south-east-

Fig. 29.—Sierra de Merida.
Scale 1 : 600,000.

12 Miles.

wards to the Apure affluent of the Orinoco. But several rising in the very heart of the cordillera have to force their way through winding gorges down to the lowlands. Thus some of the headwaters of the Apure first flow south-westwards normally with the main axis of the system, and then trend sharply round to reach the plains through deep ravines in the mountain barriers. One of these ravines, lying entirely within Venezuelan territory, may be regarded as the natural limit between the Sierra de Merida and that of Pamplona, in Colombia. Here the political frontier is formed by the Rio Tachira and the breezy heights of the Paramo Tama.

Underground Forces.

No active volcanoes have been reported in the Venezuelan highlands, but evidences of old eruptions have been observed, especially at San Juan de los Morros,

south of the Carib Mountains. The flickering flames often seen hovering over the ground are now known to be in no way connected with igneous disturbances. This curious phenomenon has been noticed on the slopes of Duida, on Mount Cuchivano in the province of Cumana, and in the marshy valley of the Catatumbo and of other streams flowing to Lake Maracaibo, where it is known as the "lighthouse" or "lantern," because it indicates to mariners the position of the land. Flames are also frequently seen flitting about amid the grasses of the llanos without burning them. These are "the fire of the tyrant Aguirre," say the natives, who after more than three hundred years are still haunted by the legends associated with this sixteenth-century corsair. The vapours rising from certain "asphalt lakes" similar to that of Trinidad are also said at times to be subject to spontaneous combustion. Such escapes of pitchy substances, known by the names of *brea*, *alquitran*, *neme*, or *mene*, are of frequent occurrence in the Orinoco delta, in the Unare basin, and on the shores of Lake Maracaibo, where they are used mixed with salt for caulking vessels.

Possibly the last manifestations of volcanic action may be indicated by the numerous hot springs, mostly sulphurous and saline, which well up in the mountainous districts, especially along the lines of fracture in the Cumana uplands around the Gulf of Cariaco, on the banks of Lake Tacarigua, in the Sierra de Merida. Sievers records altogether as many as fifty-seven groups of thermal springs in north Venezuela. According to Humboldt the most famous are those of Las Trincheras, between Valencia and Puerto Cabello, near the *boqueron*, or breach, formerly followed by the outlet of the lake. In the Araya peninsula, north of the Gulf of Cariaco, the sulphurous jets known as the Azufral Grande and Azufral Chiquito form geysers at a temperature of 212° Fahr., and deposit crystals of sulphur, as well as calcareous and silicious sediment resembling agate.

Terrific seismic disturbances are of frequent occurrence in Venezuela, which was even regarded by Humboldt as the land of earthquakes in a pre-eminent sense. One of the most destructive was that of 1812, when over 12,000 persons were buried under the ruins of Caracas. In 1550 the sea, rising 20 feet above the normal level, swept away the town and fortress of Cumana, and the same place was again overthrown in 1766, when the ground continued to tremble for a period of fifteen months. Caracas and Merida have both suffered on other occasions, and round the former city numerous fissures are still visible, which date from the catastrophe of 1812, and which have since been enlarged by the action of water.

The Llanos.

The Venezuelan llanos, which develop a regular crescent between the highlands and the course of the Orinoco, and which are limited eastwards by the delta of the great river, have a total extent of some 200,000 square miles. This vast space, however, is by no means of uniform aspect, nor are all the plains old marine beds levelled by the sea. The slight rising grounds, *bancos*, and even *mesas*, that is, heights and terraces with regular flat platforms and abrupt

scarps, like the *gûrs* of the Saharan plains, are evidently the remains of plateaux which formerly stood at a higher level, but which have been eaten away by erosions.

Some of the heights develop long chains of hills forming secondary divides for the running waters. Thus, in the eastern llanos the streams diverge in one direction towards the Caribbean Sea and the Gulf of Paria, in the other towards the Orinoco. But so low is the parting-line that in some districts it remains quite imperceptible. The level plains are also intersected at intervals by deep ravines excavated by the heavy tropical rains, and the generally monotonous aspect of the llanos is further diversified by the greater or less abundance of moisture in different districts. The humid or arid character of the land is revealed by the greater wealth or poverty of the arboreal, bushy, or herbaceous vegetation. In the extreme east the section of the llanos protected by the Cumana mountains from the trade winds is so parched that travellers crossing the steppe would perish of thirst should they neglect to bring a supply of water with them.

In the central parts of the llanos, where the surface seems perfectly level, where the line of the encircling horizon is broken by no eminence, the firmament unfolds its azure dome above a silent sea of herbaceous growth, yellowish and scorched during the prevalence of the dry trade winds, dense and verdant from the first appearance of the winter rains. Although extremely rich in different species, the boundless prairie seems to merge all its plants in the same uniform element. Except a few objects close at hand, a drooping flower by the wayside, some startled beast or insect seeking the cover of the herbage, nothing stands out distinctly in the vast circuit lit up by the solar rays. Nature reposes in its strength and majesty, inspiring with a sense of awe and sadness the solitary wayfarer lost in the wilderness. Wherever the eye sweeps the horizon the details of the landscape are the same, though its physiognomy, as a whole, changes slowly with the hours, the shifting hues and shadows.

That section of the plains which stretches along the foot of the mountains, and which may be regarded as a huge talus formed by the triturated débris of the neighbouring rocks, bears the name of *llanos altos* ("high llanos"), its mean altitude being several hundred yards higher than that of the *llanos bajos* ("low llanos") skirting the Apure and Orinoco. In some districts, especially south of Caracas and the province of Carabobo, the foothills present towards the llanos the aspect of parallel rocky terraces, disposed in the form of *petriles* ("balconies"), of such regular structure as to seem raised by the hand of man.

The limit of the plain is clearly marked by a fringe of woodlands. Here the flanks of the sierra are clothed with a continuous mantle of verdure, but at the point where the lower slopes begin to merge in the llano the forests break into groves and thickets with intervening clearings. The grassy expanse seems to penetrate into the bordering woodlands, like marine inlets into the interior of the mainland; the savanna takes the aspect of a sea with its bays, bights, creeks and islands. Here and there the brushwood forms a transition between the forest and the natural prairie, which stretches away beyond the horizon destitute of any

arborescent vegetation except a few clumps of dwarf fan-palms (*copernicia*), thorny mimosas, and stunted chaparros (*curatella Americana*).

Previous to about 1875 trees had greatly multiplied on the llanos since the beginning of the century. Nearly all the elevated plains had become decked with little patches of arborescent growths, which the natives attributed to the great falling off in livestock. During the War of Independence the belligerents lived on the cattle captured on the plains, and the result was that in a few years the herds were almost exterminated, and millions of saplings on which the animals had formerly browsed were able to develop into full-grown plants. As the rainfall is certainly sufficient to nourish an arborescent vegetation, forests might again spring up and flourish, though they would again disappear if all the land were devoted to stock-breeding. In this respect the Venezuelan llanos present a phenomenon analogous to that of the Illinois prairies. They receive less rain than the forest regions, but still enough for the development of woodlands if protected from herds and flocks. In some districts, as on the grazing-grounds of the French Alps and of Algeria, the aspect of the land has been changed by the destructive action of goats. The grass eaten away or torn up by the roots has allowed the rains to furrow the ground, and the level plains have thus been transformed to a labyrinth of winding gorges.

The rivulets rising in the sierras, and especially in the Cordillera de Merida, have an incline steep enough to rapidly discharge the surface waters into the Apure or the Orinoco. But most of the streams are only intermittent, overflowing their banks far and wide during the winter season, but during the droughts subsiding into narrow channels, and even apparently ceasing to flow. The sandy or muddy beds at this period present a succession of *charcos*, or flooded meres, separated by *playas*, or emerged sills. The fish are thus confined to terraced basins; where, however, the water never becomes quite stagnant. It continues to filter through the intervening sandy ridges, where an agreeable potable water can always be had by sinking wells down to the underground current. In the vast triangular space limited north-westwards by the Sierra de Merida, northwards by the Apure and eastwards by the Rio Portuguesa, all the watercourses without exception assume in summer the aspect of chains of lakelets separated by dry ledges.

But the continuous current is thus broken only in their middle courses. The upper reaches near the mountains, being fed by copious springs, still flow in an uninterrupted stream, while, lower down, the mainstreams, such as the Apure, Portuguesa, and Orinoco, ascend the tributaries far enough to maintain a perennial vegetation for some distance along the banks. According to the natives the Rio Guarico, which rises in the hills near Lake Tacarigua, and which flows across the Calabozo plains southwards to the Apurito, had formerly a permanent discharge, although now broken into detached pools during the dry season. Hence it would appear that the climate has become drier, or rather that the difference between the summer and winter discharge has been increased by the destruction of the upland forests and the cultivation of the riverine tracts.

Rivers.—The Orinoco System.

The Orinoco, which flows entirely within Venezuelan territory, although its western affluents have their rise in the republic of Colombia, was formerly known, amongst other numerous native names, as the Paragua, a word analogous to Paraguay, and, like it, meaning "Great Water." Orinucu, a Tamanak word already mentioned in 1531 by its first explorer, Diego de Ordaz, has probably the same meaning. The title is fully justified by a watercourse which is one of the most copious in the world, and which in South America is exceeded in size only by the Amazons and the Parana. In North America it is rivalled by the Mississippi and the Saint Lawrence, and it probably takes the eighth or the ninth place amongst the great rivers of the globe, ranking in volume after the Amazons, Congo, Parana-Uruguay, Niger, Yang-tse-kiang, Brahmaputra, Mississippi and Saint Lawrence. But before the construction of the canals turning its falls and rapids the Saint Lawrence itself was greatly inferior to the Orinoco in the extent of its continuous navigable waters. The obstructions to the Venezuelan artery are of relatively slight importance, and a clear navigable highway is presented by the mainstream and its affluents from the Atlantic to the foot of the Andes, its ramifying channels even giving access to the Amazons basin, so that a vessel penetrating into the South American waters through the Dragon's or Serpent's Mouth might sail from river to river right into the heart of Brazil or Bolivia.

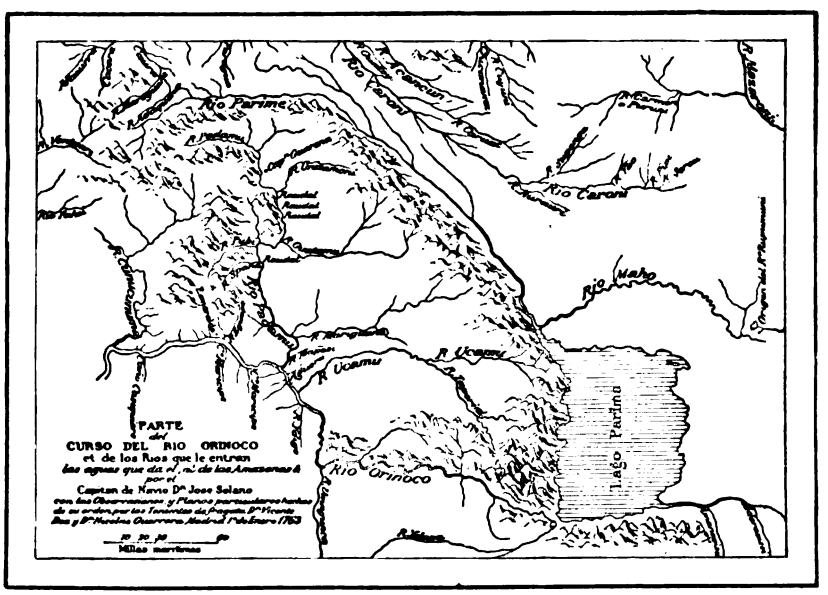
Yet these regions, so easily reached, with an abundant rainfall, a fertile soil, and an endless variety of natural products, are still almost uninhabited. The massacres and epidemics following the Conquest have done their work, and the tide of immigration setting towards the seaboard has not yet had time to reach the interior. In the whole of the Orinoco basin, including the Colombian section, there are at present not more than about 800,000 inhabitants, whereas it would contain 200,000,000 were it as densely peopled as Belgium, which it might well be considering the immense resources of the land. At the last census Ciudad Bolivar, the largest town on the banks of the Orinoco, had less than 10,000 inhabitants, a number exceeded by some Hungarian villages.

Towards the middle of the last century the Spanish Government attempted to solve the problem of the sources of the Orinoco, with a view to supporting its claims against Portugal in the question of frontiers. Diaz de la Fuente, the first explorer, ascended the river in 1760 as far as the rapids known as the Randal de los Guaharibos, from the neighbouring Indian tribe. Four years later Bobadilla undertook the same journey, but failed even to reach the cataracts. In 1840 Robert Schomburgk, after exploring the Guianas, crossed the Sierra Parima, and descended the Rio Padamo, an affluent of the upper Orinoco, as large as the branch regarded as the main headstream. Above the confluence the Orinoco is only about 100 yards wide, and scarcely deep enough for small boats. At last Chaffanjon succeeded, in 1886, in surmounting the Guaharibos rapids, and another cataract beyond them, previously known as the Salto de la

Desolacion, but since re-named the Salto de los Franceses; he thus reached, if not the source itself, at least the streamlet which lower down becomes the Orinoco.

Humboldt's survey of the bifurcation of the Orinoco was one of the great events of geographical history. But the admirers of the great naturalist carried their zeal too far when they also credited him with the discovery of the navigable channel connecting the Orinoco and Amazons basins. This channel, the Cassiquiare, was already known to the Spanish missionaries, and the boats of San Carlos on the Amazons slopes had frequently penetrated into the Orinoco by this waterway. On a map published in 1599 by Raleigh's companion, Keymis, a great salt lake is figured between the Amazons affluents and the Orinoco, which he calls Raleana, "Raleigh's river." This lake reappears under all imaginable forms in subsequent documents, and even in 1763 Captain Jose Solano, specially

Fig. 30.—Mythical Lake of Parima.



charged to survey the Hispano-Portuguese frontiers, represented the mythical Lake Parima as communicating with the two great South American rivers.

In 1638 Benito de Acosta had already stated, on the report of the natives, that the Rio Negro communicated on the one hand with the Amazons, and on the other with the northern sea, "facing the island of Trinidad, through a stream which is supposed to be the famous Orinoco," a hypothesis reproduced in Sanson d'Abbeville's map of 1656. Later Cristobal de Acuña endeavoured to show that the bifurcation took place between the Rio Negro and the Essequibo, or else the Oyapoc. At last all doubt was removed in 1725, when some Portuguese explorers ascended the Rio Negro to its upper affluents, and passed thence through the Cassiquiare into the Orinoco. The fact was afterwards established that the Cassiquiare lies in a valley, which is prolonged southwards by that of another river, where occurs a second bifurcation of streams, that of the Baria and

Canaburi, belonging to the Rio Negro system. The ditch connecting the Orinoco with the Cassiquiare stands at its highest point 920 feet above sea-level, and the latter river receives from the Orinoco only a third part of the water which it sends down to the Rio Negro.

Below the bifurcation the Orinoco flows first west, then north-west, collecting on one side a few sluggish streams from the llanos, on the other some rapid currents from the Guiana uplands. One of these is the copious Ventuari, below the confluence of which the Orinoco resumes its westerly course as far as the Guaviare, whose farthest headstreams, the Guayabero and the Ari-Ari, rise in the Sierra de Suma Paz, that is, in the Colombian Andes east of the upper Magdalena. Although obstructed here and there by dangerous narrows, the Guaviare, which sometimes takes the name of the Western Orinoco, presents an extent of navigable waters at least equal to that of the mainstream. It is accessible to steamers as far as the Ari-Ari confluence, a distance of 620 miles, and the Ari-Ari itself, which ought to be regarded as the true headstream, is said to be navigable throughout its lower course.

At its junction with the Orinoco the Guaviare discharges a volume estimated at 113,000 cubic feet. This junction may be regarded as the true hydrographic centre of the whole region comprised between the Caribbean Sea and the Amazons basin. Here converge two great lines of navigation, traversing the continent from east to west. From the Orinoco below the confluence another line, perpendicular to the first, forms the fluvial highway, while southwards the Inirida and Atabapo rivers, being connected by portages with the Guainia (Rio Negro), present a much shorter and easier route towards the Amazons than the winding channel of the Cassiquiare. The water of the Guaviare is argillaceous, and of a yellowish-white colour, whereas the Inirida and Atabapo are black, doubtless owing to the presence of organic matter, as is the case with the Irish "Black-waters," which have their source in boggy districts. The fishes of the Atabapo are all black, and none of the alligators which swarm in the neighbouring Guaviare ever penetrate into this river. Even mosquitos avoid its dark waters.

North of the Guaviare confluence the Orinoco skirts the eastern hills and mountains too closely to receive any but short and precipitous affluents from this direction. But the gently inclined western plains send down long watercourses parallel to the Guaviare; amongst others, the Vichada, whose waters are black, like those of the Atabapo. But the mainstream, which here flows at an altitude of 540 feet, has still to surmount some granite ledges before reaching the level of its normal incline towards the Atlantic. Instead of following the foot of the eastern mountains, it forces a passage through their projecting spurs, so that the cliffs of the left as well as of the right bank belong to the Guiana orographic system. The first great *raudal*, or cataract, takes the name of *Maipures* from a village and an old Indian tribe now reduced to a few families of half-breeds. From the crests of the granite rocks overlooking the falls the river is seen breaking into several arms and into countless little channels, which shift their course and volume with the seasons. Amid these winding channels rise verdant

eyots and sharp-pointed reefs, connected by the shelving rocks of the foaming rapids. The Maipures falls, nearly four miles long, are too impetuous to be navigated throughout their whole course, so that they have to be turned at several points by portages.

These falls are separated by two small cascades from the Atures cataracts, which are also named from an Indian tribe. Here are the *Cerro Pintado* ("Painted Hill"), covered with Indian hieroglyphics, and the *Cerro de los Muertos* ("Hill of the Dead"), with its cave full of skeletons, besides other rocky heights also containing sepulchral caverns. For a distance of six miles the stream winds through a succession of gorges between reefs, patches of verdure and piled-up granite boulders, nearly all of spherical shape like huge cannon-balls poised high above others of smaller size. Elsewhere the waters disappear in underground fissures, or else are precipitated in a single sheet down overhanging ledges, where the visitor may pass between rocky and aqueous walls, as at Niagara. The Atures rapids are scarcely less dangerous than those of Maipures, so that here also the navigation is interrupted by portages, although the total incline is not more than about 40 feet at Maipures, and less than 30 feet at the Atures falls. Several of the granite boulders scattered along the banks of the middle Orinoco, notably the "Tiger's Stone," near the little Marimara falls, have become famous for the musical notes that they emit, especially at sunrise, like the statue of Memnon. The phenomenon, which occurs at other places as well as in Egypt and on the Orinoco, is due to the cold night air expanding with the heat, and causing the particles of mica to vibrate as it escapes through the fissures of the rock.*

Below Atures follow other slight obstructions, as far as the confluence of the Meta, which, like the Guaviare, descends from the Colombian Andes, but greatly exceeds it in importance. Joining the mainstream below the rapids and flowing nearly in the same direction as the lower Orinoco, the Meta presents the shortest route between the Cundinamarca plateau and the Atlantic seaboard, that is to say, between the Andes and Europe. Hence it is already regarded as the future highway between Paris and Bogota. Formed by the united waters of numerous streams rising on the slopes, or even on the plateau of the eastern Cordilleras, it takes the name of Meta at the confluence of the Upia and Humadea, when it has reached an elevation of less than 500 feet above sea-level. Farther down it winds in a north-easterly course across the llanos, whence it receives several tributaries, especially from the north, the largest being the Casanare, which gives its name to a vast stretch of level country.

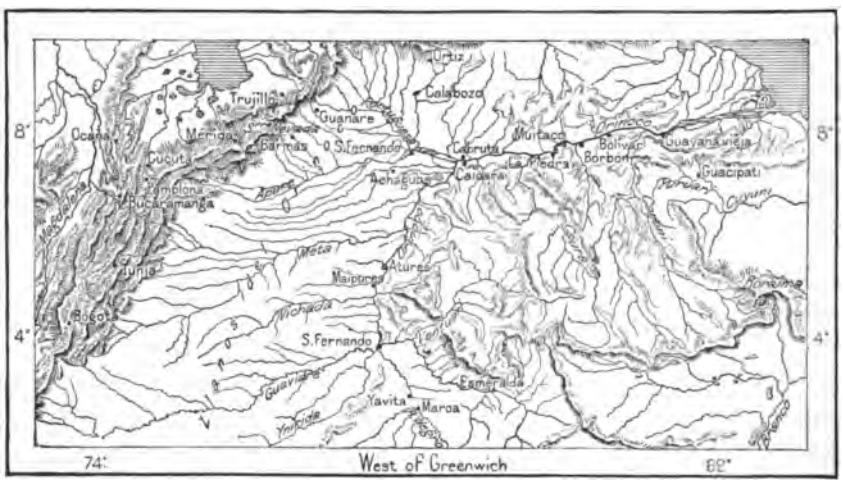
At some points the Meta broadens out to over 2,000 yards, with a depth sufficient for the largest vessels, except where obstructed by shoals and mudbanks. Between the Upia confluence and the island of Oroque, situated at about one-third of its course, it is usually navigable only for flat-bottomed barges drawing about 20 inches. But below this point it is easily accessible to steamers drawing 7 or 8 feet during the winter rains and throughout the year for the last third of

* Myers, *Life and Nature under the Tropics.*

its course. At the confluence its discharge is estimated at 160,000 cubic feet per second.

Beyond the Meta follow, on the west side, the Capanaparo and the Arauca, one above the other below the Barraguan gorges, where the Orinoco is still 1,900 yards wide. The Capanaparo rises at the base of the foothills, the Arauca on the slopes of the Cordilleras themselves, but owing to their narrow basins both are nearly destitute of affluents. Before reaching the Orinoco, the Arauca develops an inland delta common to several other streams, amongst them the copious Apure, which joins the Orinoco precisely at the point where this river, after turning the Guiana mountains, takes its definite trend eastwards to the Atlantic. Thus it happens that the Apure, coming from the Andes, forms a western continuation of the lower Orinoco. It is navigable for steamers as far as Palmarito, over 300 miles from the confluence, and its chief affluent, the Rio Portuguesa, is also

Fig. 31.—Orinoco Basin.
Scale 1 : 6,000,000.



300 Miles.

accessible to steam-launches. Below the junction of its two main branches, the Uribante and the Sarare, the placid current of the Apure is interrupted by no reefs or rapids. Like the Arauca, it forms an extensive delta at its confluence with the Orinoco, which is here 4,300 yards wide at low water, and 12,000 during the floods.

Below the confluence the yellow Apure and limpid Orinoco waters long flow in separate currents before mingling in a single stream under the Cabruta hills. Here the mainstream is so copious that it seems little affected even by such large tributaries as the Cuchivero, the Caura, and the Caroni, which descend from the Guiana mountains, and which will one day afford direct access to the Rio Branco and the Amazons; after the heavy rains the sources of an affluent of the Caroni communicate across the low water-parting with the Cuyuni, which belongs to the Essequibo basin. Some granite blocks, blackened by manganese dioxide, are

strewn along the banks of the river as far as the *angostura*, or "narrows," which formerly gave their name to the capital of the lower Orinoco, 260 miles from the Atlantic. The tides ascend to this place, but are not strong enough to stem the current, which here flows at a mean elevation of 25 or 26 feet above sea-level. The discharge at Ciudad Bolivar, above the Caroni, most copious of all the Guiana tributaries, is estimated by Codazzi at 265,000 cubic feet per second, and by Orton at nearly 530,000 cubic feet. The depth exceeds 25 fathoms in many parts of the lower course.

At Ciudad Bolivar the Orinoco rises during the floods from 40 to 50 feet, the

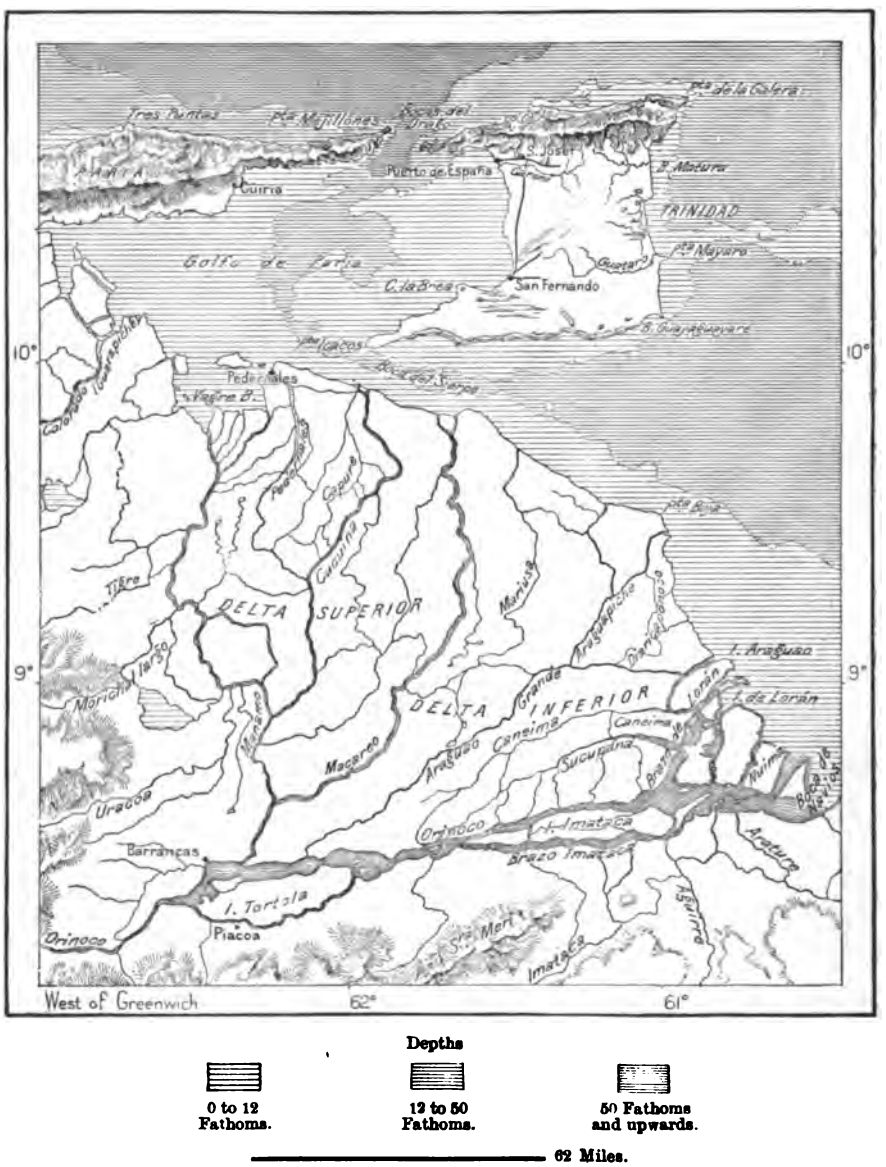
Fig. 32.—The Orinoco at Caicara

normal rise beginning on April 15th, and continuing till August. In November there is a second rise, which, however, is of short duration, and throughout the dry season the river falls continuously, exposing vast tracts along its banks and islands. On the other hand, during the floods it inundates the riverine plains to great distances. At the confluences, where several streams converge above narrow channels, the waters expand to inland seas, flooding woodlands and savannas at times for a space of 120 miles. One of the sixteenth-century Conquistadores, having heard of a "sea" away to the south of the Barquisimeto mountains beyond the llanos, pushed on to the margin of the inundated region, probably about the lower Apure, and returned in the belief that he had reached the shores of the ocean.

Orinoco Delta and Neighbouring Coast Streams.

The Orinoco delta is not disposed in a line with the axis of the fluvial valley. The chief branch, terminating in the broad estuary of the Boca de Navios, maintains the direction of the mainstream, but the Manamo, or western branch,

Fig. 33.—Orinoco Delta.
Scale 1 : 2,600,000.



ramifies at a right angle northwards to the Gulf of Paria. The triangular space enclosed by these two branches is approximately estimated by Level de Godas at 7,000 square miles, though subject to constant modifications by the floods, subsidences, alluvial deposits, and erosions. At the point where the two main branches

bifurcate the river is some 12 miles wide and of great depth; the engineer Fajardo's soundings revealed 400 feet in the year 1734.

Between the chief mouth and Vagre Bay at the entrance of the Manamo branch the delta develops a coastline of over 186 miles; the extent is even much greater if the channels of the Amacuro and of the Isla Barima be included on the east side, and the secondary deltas of the small streams rising in the coast hills on the west. The low-lying deltaic plains, where few rising grounds stand higher than the level of the flood waters, are carved into thousands of islands and banks by the endlessly ramifying branches, channels, stagnant and running waters of all sorts. Of the 48 or 50 arms flowing directly seawards, seven only are accessible to large vessels, and even these have often changed their beds and names. The most frequented, not for its depth but because it offers the most direct passage from Port of Spain (Trinidad) to Ciudad Bolivar, is the Macareo, which is taken as the dividing-line between the upper or western and the lower or eastern delta. The deepest bar, which faces the main channel, has 14 or 16 feet at ebb and from 24 to 30 at flow.

On reaching the coast the various branches are intercepted by the much stronger marine current which sets south-east and north-west, in the direction of the Serpent's Mouth, between the delta and Trinidad. Although the opening is not wide or deep enough to admit the whole current, this great ocean stream, 8 or 9 miles wide at its narrowest point, has none the less a volume of several million cubic yards per second. After passing the Serpent's Mouth, it is swollen by the contributions of all the branches of the western delta, and then expands into the broad basin of the Gulf of Paria, the Golfo Triste of Columbus, which has also been called the "Freshwater Sea," from the Orinoco currents spreading in a thin layer on the surface of the heavier marine waters. It might also be called a "Yellow Sea," so deeply coloured is the whole basin by the sedimentary matter washed down by the Orinoco, and by the coast streams which also discharge their turbid waters into the Gulf of Paria.*

Although of short length, these tidal coast streams are accessible, like the Orinoco itself, to large vessels, and the Colorado, which receives the Guarapiche affluent, is much frequented by shipping. West of the Cumana mountains, a breach in the Andean system affords a seaward passage to the Unare, a considerable stream, unfortunately obstructed at its mouth by quicksands, and consequently accessible only to light craft. Farther on the running waters are mostly little more than rivulets, the only exceptions being the Aroa and the Tocuyo rising north of the Sierra de Merida, and several streams descending to Lake Maracaibo from the snowy Andean heights. The alluvia brought down by these rivers have partly

* Statistics of the Orinoco:—

Approximate length, according to Michelena	1,600 miles.
Superficial area of the catchment basin	365,000 square miles.
Length of the navigable waters	4,500 miles.
Approximate discharge at low water, according to Orton	240,000 cubic feet per second.
Mean discharge ,, ,,	470,000 cubic feet per second.
Discharge during the floods ,, ,,	880,000 cubic feet per second.
Mean rainfall in the basin, according to Codazzi	74 inches.

filled up Lake Maracaibo, which has been considerably encroached upon by the land in recent times.

The Catatumbo, most copious affluent of this inland sea, belongs to both of the conterminous republics, Colombia and Venezuela. Its headwaters rise in the mountainous Ocaña district near the Magdalena basin, and although the discharge is extremely irregular, both the Catatumbo and its southern affluent, the Zulia (Sulasquillo), are navigable for small steamers throughout the year. At the Zulia confluence the Catatumbo has already entered the low-lying plain which at one time formed part of the Maracaibo basin; according to Vergara y Velasco, it has a mean discharge of about 15,000 cubic feet per second.

The Maracaibo Inlet—Lake of Valencia.

The Maracaibo lagoon, called also the "Sack of Venezuela," may be regarded more as a lake than a marine inlet, although its level is affected by the tides to the extent of a few inches. At the entrance the difference between ebb and flow is as much as 3 or 3½ feet, but a short distance above the bar its waters are already quite fresh. Despite the continual encroachments of the land, it has still an area of no less than 8,000 square miles, with a shore-line of about 370 miles, apart from the thousand little indentations round the coast. Although its extreme depth is scarcely 80 fathoms, the basin might be almost everywhere navigable by large vessels were the approach not closed by two bars little over 10 feet deep.

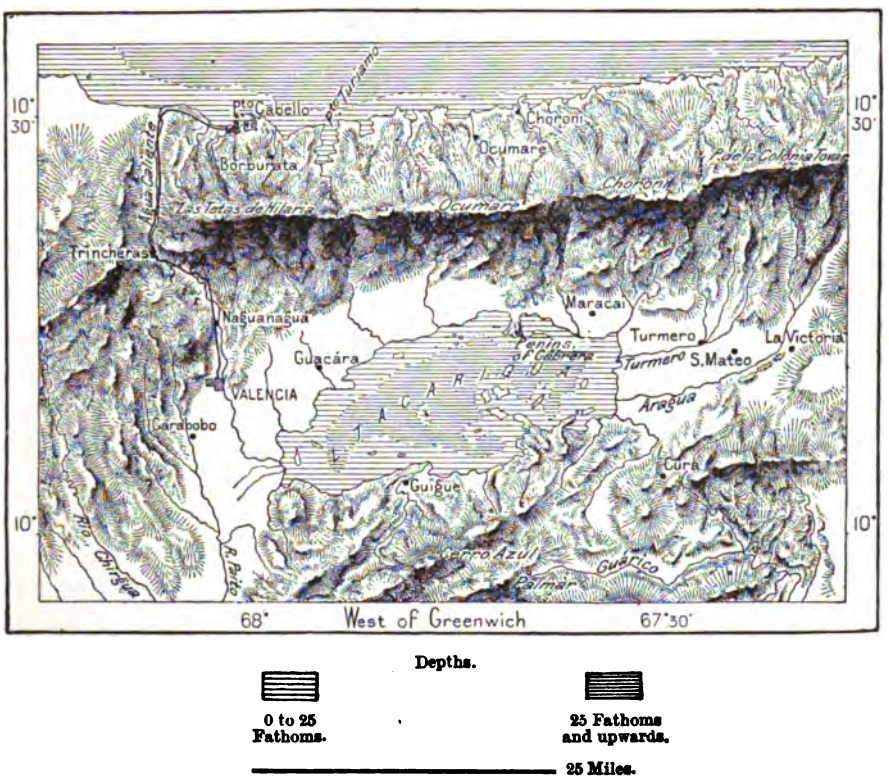
Beyond the islands extending right across the mouth of the "Sack" lies the old "Gulf of Venice," on which stood the Venezuela ("Little Venice") which gave its name to the whole land. This marine inlet is sheltered from the gales of the high sea by the two converging peninsulas of Paraguana, on the east, and Goajira, on the west.

In Venezuela almost the only lake properly so called is the famous closed basin of Valencia, which has received the name of Tacarigua ("The Lake" in a pre-eminent sense). It fills a great part of the Aragua valley, the most fertile and most densely peopled district in the republic. Viewed from the shore, the whole basin seems to be encircled by an amphitheatre of hills, the coast range on the north and the mountains skirting the llanos on the south side apparently converging east and west, so as to complete the circuit of surrounding heights. But beyond the western extremity of the lake two openings are revealed, one very narrow, in the north, giving access to the sea along the foot of the Tetas de Hilaria, the other much broader, through which the Paito flows south to the Pao affluent of the Orinoco.

At present the tarn stands at a mean level of about 1,410 feet above the sea; but it formerly rose much higher, and then it discharged its overflow through a southern emissary, traces of which are still plainly visible on the face of the cliffs. According to the local records and the reports of the old inhabitants, it was several times in communication with the Orinoco basin through the Caño Camburi, alternately an effluent and an affluent of the Lake of Valencia. This outlet has fallen by erosion hand in hand with the level of the lake.

Since the time when the Tacarigua drained to the Orinoco, it has frequently changed its form and volume. In the middle of the sixteenth century, when the Spanish conquerors founded the city of Victoria, the margin stood, according to Oviedo, only "half a league" farther east. But in 1800 Humboldt and Bonpland found the intervening space had increased to 2,700 toises, or about double that distance.* Since 1796 the gradual subsidence had exposed new islands, the *Nuevas Aparecidas*, while a fortalice erected on Cabrera Island had become connected by a strip of sand with the mainland. The inhabitants supposed that this gradual subsidence must be due to the opening of some underground channel,

Fig 34.—Lake of Valencia.
Scale 1 : 1,000,000.



a view not justified by the nature of the surrounding rocks. Humboldt attributed it to the destruction of the forests and the development of agriculture; nor can there be any doubt that the plantations now covering the slopes to a great height round the encircling hills must absorb much water, which formerly escaped to the lacustrine basin. But the level again rose when the forests recovered a part of their old domain owing to the havoc caused by the War of Independence. Then with the return of peace and of peaceful pursuits the waters once more subsided, and in 1888 Valencia had retired 5 miles from the nearest point of the lake. But although it has become very slightly brackish, there is no fear of its disappearing

* The old French toise was rather more than a fathom, 6·395 English feet.

altogether, and sooner or later the balance cannot fail to be established between the inflow and the quantity carried off by evaporation, if indeed it is not already established, as some suppose. At present the basin has an estimated area of 220 square miles, a mean depth of 100 feet (extreme, 300), and a rainfall of 73 inches, which is rather more than that of Lake Geneva.

III.

Climate of Venezuela.

Venezuela lies entirely within the equatorial zone, so that all the low-lying or moderately elevated tracts are traversed by the thermal equator of 77° to 84° Fahr., which is normal for the New World. But as in Mexico and other tropical lands crossed by lofty ranges, the climate presents a succession of hot, temperate, and cold zones, and in the Sierra Nevada de Merida the mean temperature is only four or five degrees above freezing-point at the altitude of 14,600 feet, which marks the limit of vegetation. Usually 1,800 to 2,000 feet, answering to the isothermal of 77° Fahr., are taken as coinciding with the parting-line between the hot and temperate lands, the coco and cacao plants ceasing to grow above this elevation. The cold zone may be said to begin at about 7,200 feet, where the mean temperature is 59° Fahr., too low for the banana, sugar-cane, and manioc, which are here replaced by wheat, barley, and potatoes.

But independently of the local temperatures, the great bulk of the inhabitants are concentrated almost exclusively in the longitudinal valleys of the Andean coast ranges, all the rest of the land being very thinly peopled. In fact, there are scarcely any whites or civilised Indians at all in that half of the republic which lies south of Bolivar within the great bend of the Orinoco. By far the hottest region are the llanos between the river and the foot of the mountains, where the heat is not even tempered by the sea breezes.

The most favoured districts are the plateaux and terraces rising above the hot zone, and here are situated the towns of Caracas, Valencia, Barquisimeto, and Merida, each with its own climatic peculiarities. Caracas, lying in a sort of trough opening east and west between two parallel ranges, is exposed only to the dry, hot morning breeze from the east, and to the vapour-charged afternoon breeze from the west. The rains, which usually fall towards four or five o'clock in the evening, are nearly always accompanied by electric discharges, although the heaviest rains and fiercest thunderstorms are chiefly confined to the wooded mountains of the north.*

Lying altogether within the north torrid zone, Venezuela is comprised within the domain of the north-east and east trade winds. But the normal currents are endlessly modified by the marine inlets, the inequalities of the surface and other local conditions. The "breeze," as the trade wind is called on the seaboard, blows harder in the day than at night, when it is even replaced on the coast by a land breeze due to the cooling of the ground after sunset.

* Climatic conditions of Caracas:—Mean temperature, 72° Fahr.; coldest month (January), 68° Fahr.; hottest month (May), 93° Fahr.; mean atmospheric pressure, 27 inches; mean of rainy days, 74; mean annual rainfall, 30 inches.

The trades are also more regular during the winter months from November to March, when the sun is at the zenith of the southern tropical zone. They grow more gentle, or even give place to unstable southern or westerly winds, in the season from April to October, when the sun moves to the north of the equinoctial line. The trades are popularly said to ascend the Orinoco no farther than the cataracts, and they are prevented by the mountains rising in the east of Guiana from circulating on the low-lying regions between the falls of the Orinoco and those of the Rio Negro. At Maipures the wind is said never to blow, so that the heats are unendurable, while the very skies are darkened by clouds of mosquitoes. Here the phenomenon of sheet lightning unattended by the roll of thunder is very common.

Flora.

Nowhere are the marvellous tropical forests, with their tangle of lianas and parasites, intermingled in greater profusion than in the Orinoco delta, around the shores of Lake Maracaibo, and at the foot of the Sierra de Merida. Nor, on the other hand, can a greater variety of herbaceous and other low plants be anywhere seen than on the Venezuelan llanos. Although consisting almost exclusively of cereals and of allied families, the vegetation of the llanos is extremely dense. The lower parts have received the name of *esteros*, or "lagoons," because periodically flooded by the Orinoco or its affluents, whose deposits serve to feed myriads of young plants.

In the llanos the most frequently-met trees, usually of small size, and isolated or in small clumps, are the *chaparros* (*curatella*), with rough and nauseous foliage, and the *copernicia* palm, called the *palma llanera* in a pre-eminent sense, or the *palma de cobija* ("roof palm"), because its immense leaves, 12, 14, or even 16 feet long, are used for thatching the native cabins. Although forests consisting exclusively of palms are rare, groves of the copernicia occur on the llanos, in which these palms are disposed in natural groups of five to the square (in quincunx order), like the pines and spruces in the forests of West Europe, and without any undergrowths or lianas, such as those of other tropical forests. Here and there the ground is also covered with the green and red bushes of the sensitive plant, locally called *dormidera*, or "sleeper."

One of the commonest palms is the mauritia (*mauricia flexuosa*), the *murichi* of the Guaraunos, and the "staff of life" for many native tribes. It not only supplies the peoples of the Orinoco delta with the materials for building and roofing their huts, and with the fibre used for hammocks and cordage, but its fruit, pith, and sap also yield food and drink in various states of fermentation.

The Venezuelan flora comprises several other remarkable plants, such as the saman, a gigantic mimosa, nearly always solitary, with wide-spreading branches and delicate pink foliage. On the coast ranges occurs the milk-tree (*brosimum galactodendron*), a member of the bread-fruit family, which, when tapped, yields a milky fluid, nearly of the same consistency and composition as cream. Yet this fluid is not potable, nor is the tree cultivated. The calabash (*crescentia cujete*),

whose fruits serve as vessels of all shapes and sizes, also supplies a tissue singularly like cloth, and used as such by the riverine peoples of the upper Orinoco.

Several vegetable species are highly appreciated for their medicinal properties. The *coloradito* shrub supplies a bark more efficacious than cinchona itself in the treatment of marsh fevers. A peculiar species of cinchona has also been found in the Merida mountains, and the *copayfera officinalis*, which furnishes the copaiva balsam so efficacious in certain maladies, grows in abundance along the banks of the Orinoco, between Bolivar and Caicar.

In 1595 Sir Walter Raleigh brought back an account of the deadly "curare" (*urari*) poison, which he had received from the Indians of Spanish Guiana. This substance is still prepared in the same region, the present East Venezuela, as well as in Amazonia; the processes vary, but the plant is everywhere the same, the mavacure (*roudamon guianense*), a member of the strychnine family; with the sap are mixed a few drops of snake poison, producing a black essence with bright cleavage, somewhat like liquorice. The Otomaks were said to rub a little under their nails, thereby causing a mere scratch to be fatal. The strange effect of the poison is, without affecting the sensibility, will, or intellect of the victim, to deprive him of his voice, and then to paralyse, one after the other, the extremities, the face, and thorax, at last extinguishing the eyesight, and thus, so to say, immuring the mental faculties in a corpse.*

Fauna.

The Venezuelan fauna belongs partly to the Colombian, partly to the Guiana zone. The Andean regions, from the Paria peninsula to the snowy Merida range, are inhabited by animals whose centre of dispersion lies farther west, on the plateaux dominating the Magdalena and Cauca valleys. On the other hand, the forms occurring on the llanos, in the valleys beyond the Orinoco, and in the Parima uplands closely resemble those of the Guiana seaboard and of Brazilian Amazonia. It naturally follows that the parting-line between the two zones, that is to say, the southern slopes of the coast ranges and the tracts bordering on the grassy plains, are extremely rich in all forms of animal life.

The simian family is represented by sixteen species in the primeval forests of the lowlands and of the lower slopes, scarcely any being met above the line of 10,000 feet. The best known, thanks to his horrible morning and evening concerts, is the howling ape (*simia ursina*), whose hideous screams dominate all sounds issuing from the woodlands. There are also numerous varieties of the bat, amongst others a fishing bat, which in other respects is identical with the frugivorous bats of India and the Antilles.

In Venezuela the naturalist meets nearly all the South American species, such as the large and small felidæ ("tiger," or jaguar, "lion," or puma, ocelot, and cats); bears of a harmless disposition, living on fish and honey, and ranging in the Sierra de Merida up to 10,000 feet; the ant-eater (*myrmecophaga jubata*),

* Jean Chaffanjon, *Tour du Monde*, lvi., p. 307.

furnished with formidable fore-claws; the cavy, *cabiai* or *chiguiri* (*cavia capybara*), a timid rodent which swims well but runs badly; the graceful cuchi-cuchi (*cercoleptes caudivolvulus*), which when tamed makes a most delightful pet; the sloth (*bradypus tridactylus*), which, after devouring the foliage of a cecropia, utters long plaintive cries at having to climb another; the frog-fisher (*chironectes variegatus*), which lives on fish, and is often captured in the rivers with the prey he was pursuing. Two species of cetaceans ascend the Orinoco, the manatee and porpoise.

The avifauna is even richer than the order of mammals. The *guacharo* (*steatornis caripensis*), at one time supposed to be peculiar to a smally hilly district west of the Gulf of Paria, has since been met in a few other places, and especially in the islands of the Dragon's Mouth between Trinidad and the mainland, as well as in the caves and gloomy gorges of Colombia, where it takes the name of *guapaco*. The guacharo resembles the bat in its habits, and is one of the rare nocturnal birds that are frugivorous. Its fat yields a semi-liquid, transparent, odourless oil which keeps for over a year without becoming rancid, and which makes an excellent condiment.

One of the most easily tamed Venezuelan birds is the *gallito de laguna* (*porphyrio martinica*), a species of rail noted for the graceful dances performed by the male in presence of his mate. The trupial (*icterus*), foremost warbler of the woodlands, suspends its nest from a branch by a long thread to avoid the attacks of snakes. Countless myriads of aquatic fowl frequent the labyrinthine waters about the Arauca, Apure, and Apurito confluences of the Orinoco. A cavalry regiment encamped near a lagoon in this region is stated to have lived for a fortnight on wild duck without appreciably reducing their numbers.

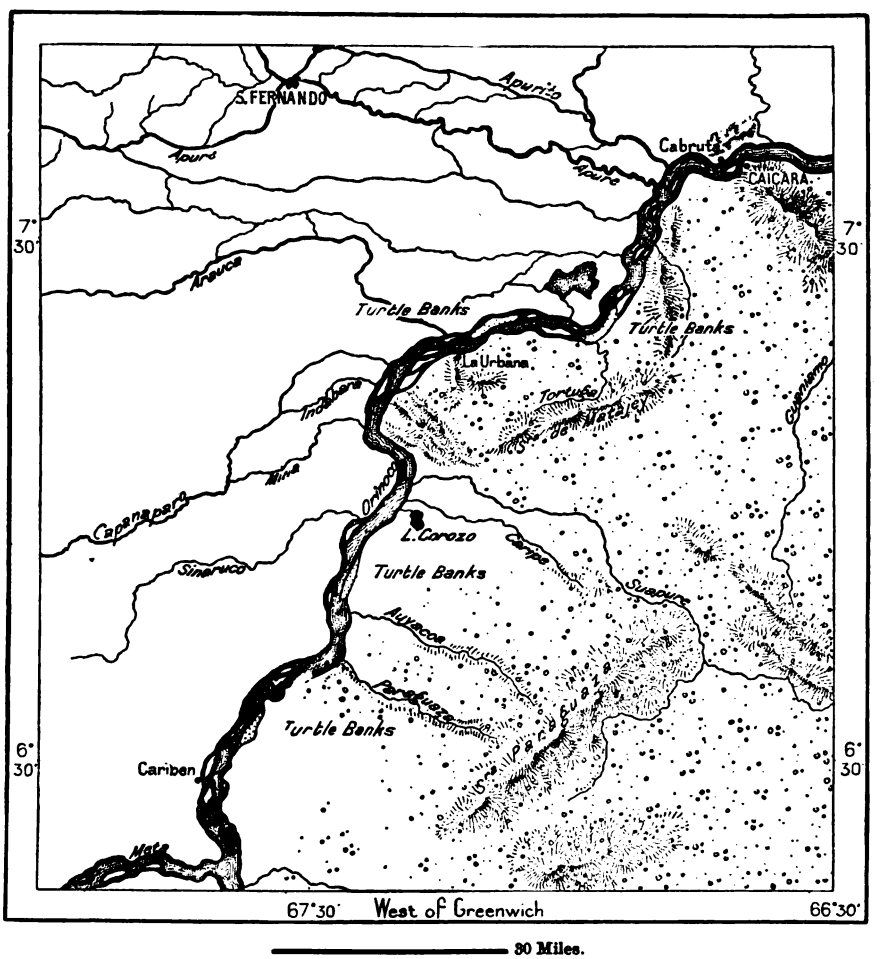
The reptile world also is extremely rich, especially on the llanos, where multitudes of snakes glide about beneath the herbage. In the Venezuelan rivers and lakes there are at least three species of saurians—the bava (*alligator punctatus*), which never exceeds 6 feet, and never attacks bathers; the cayman, infesting the streams of the llanos; and the crocodile properly so called, met in the large affluents of the Orinoco, and, according to native report, sometimes exceeding 22 or 23 feet in length. In some places they are little feared, in others much dreaded; but all that have once tasted human flesh, known as *caimanes cebados*, never fail to attack man, even out of the water. During the dry season the crocodiles migrate southwards to the large affluents of the Orinoco, following the muddy bed of the streams; when these become quite dry they bury themselves in the mud, which hardens above their long summer sleep. The *curito* (*lepidosiren paradoxa*), a fish inhabiting the Rio Apure, has acquired the same habit of passing the summer in a torpid state under the hardened bed of the stream. Other fishes, especially certain species of dorados, are able to live for hours out of the water.

On the upper and lower Orinoco the turtles lay their eggs singly on the river-banks, but in certain parts of the middle course, between the Meta and Apure confluences, they form processions of tens and even hundreds of thousands,

moving like shoals of herrings or sardines, in obedience to some mysterious attraction, to various spawning-grounds, where the eggs are deposited and hatched. These turtles (*cinosternon scorpioïdes*), about 3 feet long, and weighing about 60 pounds, usually begin their great nocturnal processions towards the end of March, pursued by the jaguar and the surrounding populations. According to Chaffanjon, about 500,000 turtles lay some 50,000,000 eggs, yielding from 15,000 to 20,000 gallons of oil, in this district of the

Fig. 35.—Turtle Banks on the Middle Orinoco.

Scale 1 : 1,600,000.



Orinoco. But unless the trade is regulated, like that of the fur-bearing seals, the whole species is doomed to disappear. Already during the present century the Cariben turtle-bank has been almost entirely abandoned.

Thanks to the descriptions of Humboldt, one of the best-known animals in Venezuela is the electric eel (*temblador*), which frequents certain creeks in the llanos. During the dry season, when the impoverished streams break into basins of stagnant water, the sexes separate into different pools, where their discharges

soon kill the other fishes. After devouring everything they often remain for months together without any food. The electric apparatus, which is extremely complex, occupies nearly the whole body, the several functional organs being all grouped in the anterior part of the animal. Humboldt's sensational account of their capture by means of horses driven into the water and exposed to their attacks until the batteries are exhausted, must have reference to some quite exceptional incident. Even when horses were counted by the million on the llanos, they were too valuable to be thus sacrificed when a simple fishing-line or a net sufficed to take the eels.

Certain streams in the Apure basin are carefully avoided by bathers, less through fear of the crocodiles than of these and other electric animals, such as the parayas (*serra salmo*) and the "caribs." Some of the creeks are said to contain "more caribs than water." These ferocious fishes, which can cut through large hooks with a snap of the teeth, attack their prey and devour it with incredible fury; at sight of the blood caused by the prick of a spur, they rush at the wound, and quickly disappear in the very bowels of the horse—hence their local name, *mondongueros*, or tripe-eaters. The term, "carib," has reference to the terror inspired by them, as once by the Carib Indians, "the cannibals," that infested the Orinoco plains.

Inhabitants of Venezuela.

The reports of the Conquistadores, of the early travellers and missionaries record the names of hundreds of tribal groups, not all, however, greatly differing from each other. Such names often indicate little more than differences of locality, so that kindred tribes of like speech, traditions and usages might still be known by many names. The word, *coto*, terminating several tribal designations, had reference to their respective districts, as in Cumanacoto, Pariacoto, Chagaracoto, Arimacoto, "People of Cumana," Paria, &c.

It would no longer be possible to classify all the peoples mentioned in the history of Venezuela, for most of them have disappeared, or rather have become absorbed by miscegenation in the common Venezuelan nationality. Their names survive in the local nomenclature, but they can themselves be no longer recognised in the present populations. Many have also been exterminated, amongst others the dwarfish Ayamanes met by Fredemann in the mountains south of Barquisimeto. Although well proportioned, these pigmies were no more than "five empans" (about three feet three or four inches) high; but no recent traveller has come upon their traces.

Most ethnologists affiliate to the Caribs the tribes of the Orinoco, some of whom still survive. Formerly these Caribs were supposed to have come from North America by the chain of the Antilles. But the philological studies of Lucien Adam, and the explorations especially of Von den Steinen and Ehrenreich in the valley of the Xingu, a southern affluent of the Amazons, have placed beyond doubt the Brazilian origin of this race. The Carib language and traditions are best preserved by the kindred tribes of central Brazil, from which region the Caribs migrated northwards.

Amongst the undoubted Carib tribes are the Vayamaras of the Rio Payagua, the Arecunas of the Caroni, and the Chaimas of the Caripe coast range. The Guayanos, who give their name to the vast region of Guiana, are divided into numerous groups, all of distinctly Carib type.

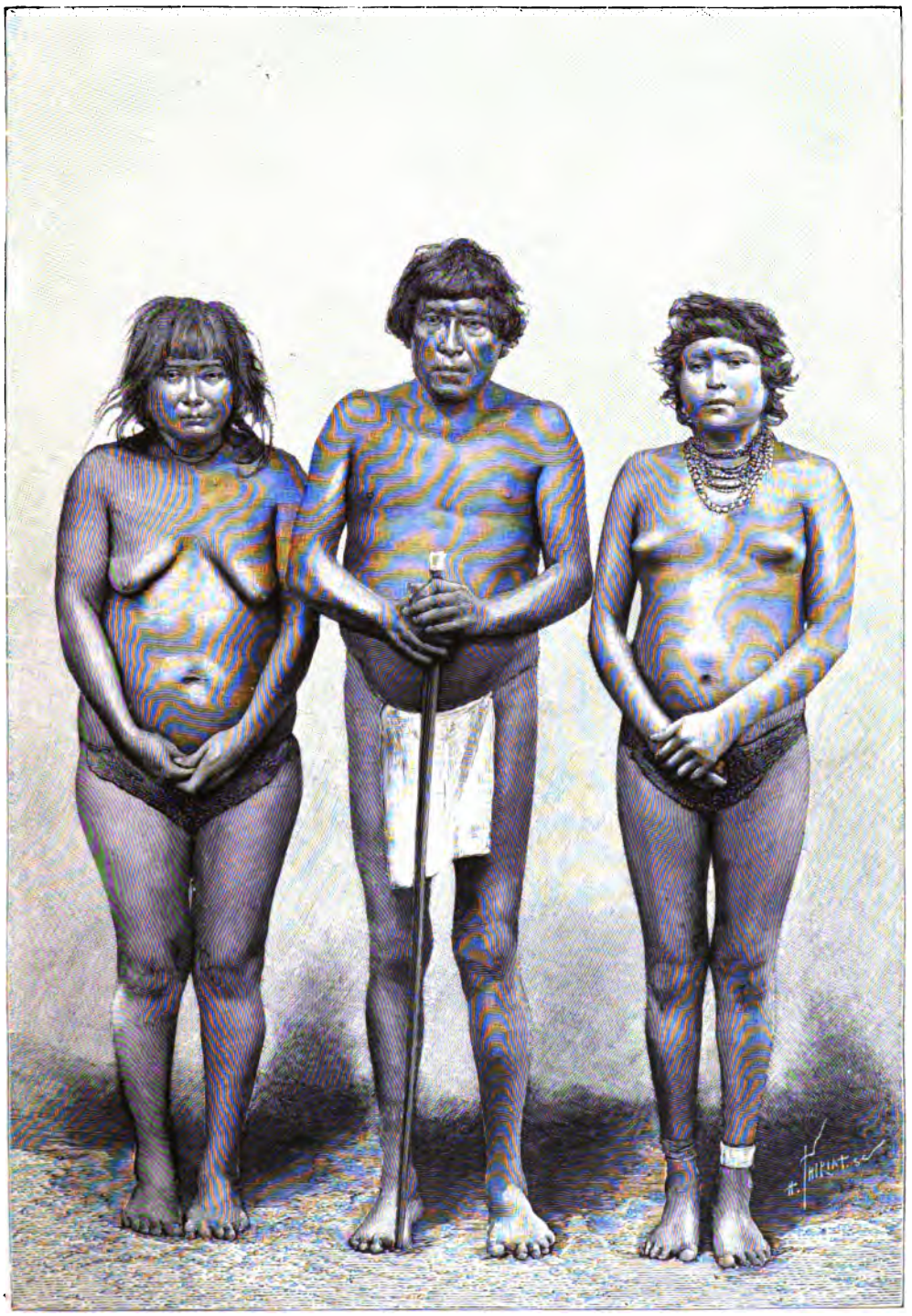
The Colombian Muyscas are also represented in Venezuela by the Timotes of the Merida highlands, who are remarkable for their pronounced dolichocephaly, and who formerly spoke Muysca dialects. Most of the other aborigines appear to have always inhabited Venezuela, or at least to have occupied the country from remote times. Moreover, their range extends southwards as far as the Bolivian uplands and the sources of the Paraguay. Lucien Adam has given them the collective name of Maipures, from one of their groups in the middle Orinoco valley described by Humboldt. They are the Arawaks (Aruacos) of English and other writers, a name going back to the first period of the Conquest. The Arawaks were always at war with the Caribs, both in the Antilles and on the mainland, where most of them were driven west of the Orinoco, and, farther south, to the Amazonian regions bordering on the Cordilleras. The term Arawak no longer survives in the present Venezuela, but it has been preserved amongst the Indians of Dutch Guiana and of the Brazilian Rio Negro.

Numerous rock inscriptions recall the presence and migrations of ancient peoples who have for the most part disappeared. One of these "documents" occurs at an altitude of no less than 8,200 feet, near the summit of Mount Naiguata in the Caracas coast range, where are seen some now nearly obliterated figures. In the Merida highlands, a Muysca domain, inscribed stones and "idols" are more numerous than elsewhere. The general type resembles that of similar remains found in great numbers on the Colombian plateaux, but are of less finished workmanship. For the present Indians these rude effigies are mere *muñecos* (dolls), unless a cross has been inscribed by some pious hand on the idol's forehead; then it becomes a *santico*, a "little saint," which may be worshipped without incurring the charge of idolatry. Thus are blended the old and the new beliefs.

The Cerro Pintado ("Painted Rock") between the Atures and Maipures rapids presents a curious group of figures, including a man, a snake 400 feet long, and various other animals. A few miles higher up, the caves and fissures of the Cerro de los Muertos, the Cerro de Luna, and other caverns contain numerous skeletons deposited by different Indian tribes, and accompanied by a jar of some fermented drink to slake the thirst of the deceased on his journey to cloudland.

On the north side of Lake Tacarigua are seen over fifty *cerritos* ("hillocks") which were formerly supposed to be natural eminences, but which are now found to be sepulchral mounds. Here the flesh was removed from the bones before interment, and the remains disposed in regular order in the cone-shaped sarcophagus placed in the centre of the barrow. These mound-builders belonged to the polished stone age, and made perfectly symmetrical earthenware, probably with the potter's wheel.

One of the best known of the Venezuelan wild tribes are the Guaraunos (Waraun), who are scattered over the Orinoco delta and neighbouring lowlands.



GROUP OF GUARAUNOS INDIANS.

They are generally well made, but of short stature, stout, thickset, and healthy, despite the stagnant waters of their environment. The face is broader than long, but the nose is not flat like that of the negro, and their language differs fundamentally from those of the neighbouring peoples. During the floods the Guaraunos formerly lived in pile dwellings, or in structures raised on clumps of palms, making a platform by interlacing the branches 15 or 16 feet above high-water mark. These habitations were shared by a breed of dogs which resembled the European collie, and which helped in capturing the fish. Although called in question by Level de Godas, these statements, made by Raleigh, Humboldt, and others, seem probable enough, and are confirmed in their main features by Plassard and Crevaux, who have visited the Guaraunos since the time of Level de Godas. The race appears to be dying out, being at present reduced to some 10,000 or 12,000 according to Plassard's estimate.

Since the time of Humboldt frequent mention is also made of the Otomacos, who dwelt between the Meta and Arauca affluents of the Orinoco. They were numerous, especially about the Barraguan reefs, where they pointed to some large boulders as the ancestors of their race. All the dead had to be buried in some rocky recess of this Orinoco gorge. The Otomacos were even more skilful ball-players than the Basques; the game was played, not with the hand, but with the right shoulder, which was used as a bat to receive and return the rubber ball, and at times the players grew so excited that they tore each other with their teeth, fighting literally "tooth and nail."

During the two or three months of the floods, when the supply of fish failed, the Otomacos fed on earth, taking regularly every day about a pound or so of a slightly-baked very fine clay, which was supposed to contain a multitude of animalcules. When analysed, however, by Vauquelin, it was found quite free of organisms; yet it did not cause the fatal maladies produced by a morbid taste for earth in other Indian and negro peoples.

After the close of the colonial administration most of the old "missions" were abandoned, and the settlements fell into ruins. Travellers in the middle Orinoco region no longer speak of the Caberres and other tribes mentioned by Gumilla in the first half of the eighteenth century. All these converted and semi-civilised natives have been greatly reduced in numbers since their release from priestly control and their return to the savage state, whereas the half-breeds have multiplied threefold.

But, despite wars, the oppression of the dominant classes, epidemics, and hardships of all sorts, the wild tribes, who are not reckoned as *gentes de razon* ("reasonable beings"), are still more numerous in the forests and savannas. But, as a rule, those groups alone are mentioned whose territory lies along the beaten track of travellers. Such are the fierce Guaicas and the neighbouring Guahariboes, who give their name to one of the headwaters of the Orinoco; the Maquiritares, also on the upper Orinoco and in the Ventuari valley; the Banivas, who collect rubber in the forests of the Atabapo and lower Guaviare; the dreaded Guahibos of the Rio Vichada; the Yaruros and Guamos, who have

displaced the Otomacos about the Arauca confluence; the Piaroas of the cataracts, and others.

Broadly speaking, the Indians dwelling north and west of the Orinoco are peaceful agriculturists, while those within the great bend of the river are still in the savage state. Amongst the latter are met the *piaches*, or wizards, who, like the medicine-men of the redskins, heal or bewitch with music and spells.

The white population, mainly confined to the seaboard, are all mestizoes, with the exception of a few scattered groups such as the Spaniards of La Grita, on the north slope of the Merida range. Although the Basque language has long ceased to be spoken, many of the Europeans are really of Basque descent. La Guaira, Puerto Cabello, and Calabozo were founded by Basques, who also colonised the rich Aragua valley, the most flourishing region in the republic.

The Spaniards appear to be acclimatised even in the hot zone, while other Europeans and North Americans live in thousands at Caracas and other upland towns of the Andes without suffering from the climate. But the llanos, and especially the marshy districts, are subject to epidemics, some of which attack the very fish, the crocodiles, and domestic animals. Horned cattle generally escape, but in 1843 the pest swept away from 6,000,000 to 7,000,000 horses, asses, and mules. This plague, which is always fatal, appears to be a spinal affection caused by parasitic animals.

The immigration of non-Iberian whites has acquired importance only during the present century. But negro slaves had long been introduced to work on the plantations. At the time of Humboldt's visit they numbered 62,000; but they were reduced to 50,000 by the wars, epidemics, and earthquakes by the year 1830, when the traffic was abolished. Most of the freed men have mingled with the other elements of the population, so that at present there are but few pure negroes in Venezuela. The type is best represented in La Guaira, Puerto Cabello, and the other coast towns.

Several hundred white immigrants arrive annually, chiefly from the Canaries, France, Italy and Germany. These *jorungos*, as they are called, generally avoid the land, and adopt some trade or profession in the towns. Their influence is, nevertheless, considerable, and but for them public works would be even in a more backward state than is the case. They have directed the mining operations, the erection of public buildings, the harbour works, the construction of roads and railways. They thus act indirectly on the land itself, which with the opening of communications is daily brought more under cultivation, at least in the vicinity of the centres of urban population.

IV.

Topography.

Venezuela has no seaport on the Gulf of Paria even remotely comparable to Port of Spain in the neighbouring British colony of Trinidad. The only convenient harbour occurs, not on the gulf, but on the Rio Guarapiche (Caño Colorado) about 30 miles below *Maturin*, the chief market for the produce of all

GENERAL VIEW OF CARUPANO.

the plantations on the lower slopes south of the Cumana coast range. The little port of *Guiria* in the hilly peninsula of Paria, although well sheltered, is visited only by small coasters; the neighbouring agricultural district is too limited to feed a large traffic.

Carupano, a little farther west, is more conveniently situated towards the middle of the advanced coastline formed by the Paria and Araya peninsulas projecting east and west from this point. South of the inlet easy communication is afforded through a gap in the coast range with the fertile inland valleys, so that with a sufficiently developed railway system Carupano could not fail to become the chief outlet for the cacao, tobacco, and coffee of all the surrounding plantations; the approach to the harbour, however, is obstructed by some dangerous banks. *Cariaco*, still farther west, at the extremity of the Gulf of like name, is little visited, despite its well-sheltered anchorage. The neighbouring salines, especially those of the Araya peninsula, yield considerable quantities of good salt.

CUMANA—BARCELONA.

Cumana, former capital of the old colonial province of New Andalusia, and till recently the chief centre of population in the eastern districts of Venezuela, was the first Spanish settlement on the mainland. Some vestiges may still be seen of the fortress here founded by Diego Colon in 1520. *Nuevo Toledo*, as it was first called, became later *Nueva Cordoba*, and ultimately took the name of Cumana from its river, which is itself now known as the Rio Manzanares.

Of all Venezuelan towns Cumana has suffered most from earthquakes; as a precaution against fresh disasters, all the houses are now built very low, while those of the Guayqueries Indians, on the opposite or west side of the Manzanares, are mere straw-thatched huts. The spacious roadstead is little visited by shipping, the various havens of the seaboard being more than sufficient for the undeveloped traffic of this region.

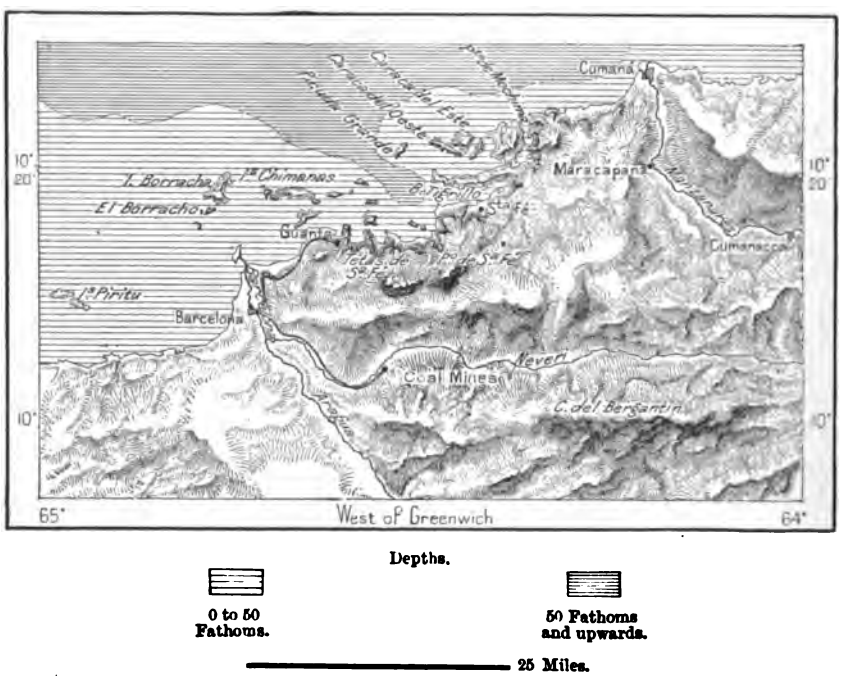
The highly-esteemed tobacco of the *Cumanacoa* district, in the upper Manzanares valley, is all exported from Cumana, which stands on one of the classic sites of the New World. A few miles to the south was situated the old pre-Columbian city of *Ameracapana*—the *Maracapano* or *Macarapano* figuring on recent maps—meaning, in the local Indian language, "Ameraca-town." In 1542, when the traveller Benzoni visited this place, he found it, although much decayed, still occupied by a colony of about 400 Spaniards, who carried on a large trade with the interior, and with the slave-dealers who brought their gangs of captives to the Ameraca market. During Benzoni's stay a single dealer arrived with a convoy of over 4,000 Indians, while hundreds had perished of hunger and hardships on the road. The colonists of Española traded directly with Ameraca, which at that time was the emporium of the whole seaboard of South America. According to Pinard's hypothesis, the name of this city, converging point of all the trade routes of the southern lands washed by the Caribbean Sea, was applied first to the neighbouring mainland, and then to the whole of the New World. The change from Ameraca, or Amaraca, to America would be easily explained by the obscure

articulation, especially of the vowels, by the Indians of those parts.* It is to be noted, however, that Cristobal Guerro and Paralonzo Niño, who visited the mainland in the year 1499, mention the place under the name of *Maraca*, which differs considerably from the form finally adopted for the continent on the proposal of Waltzemüller or Jean Basin. In his voyage of 1595 Walter Raleigh still refers to *Maracapana* as the general designation of all the seaboard stretching east and west between Guiana and the "province of Venezuela."

Cumana, an Andalusian foundation, has been eclipsed in commercial activity and population by *Barcelona*, a Catalonian settlement, dating from the year 1637. It stood originally on the slopes of the Cerro Santo ("Hollymount"), but was

Fig. 36.—Barcelona and Cumana.

Scale 1 : 1,100,000.



afterwards removed to the foot of the Morro de Barcelona, an isolated headland on the banks of the Rio Neveri, close to the coast. Barcelona is conveniently situated, at the western extremity of the Cumana coast range, for the export of such local produce as cacao, coffee, skins, and dyewoods. Unfortunately, its harbour is so obstructed with dangerous quicksands, caused by the deposits of the Rio Neveri, that the shipping has to ride at anchor in the offing, to the windward of the shelter afforded by a cluster of reefs and islets. Hence a new harbour has been selected, some 12 miles north-eastwards, in the small but deep and well-sheltered creek of *Guanta*, which is now connected by rail with Barcelona Another line runs south-eastwards up the Neveri, in the direction of the Naricual valley. In the sandstone hills of this district have recently been discovered

* *Société de Géographie de Paris*, November 20th, 1891.

some beds of a coal which burns with a very long flame, leaving but a slight quantity of ash. These carboniferous sandstones would appear to belong to the Permian system.*

La Guaira—Caracas.

West of the Neveri the low and marshy beach develops a semicircle of over 120 miles to Cape Codera, the eastern headland of the Caracas range. Farther on lies the deep inlet of *Caravellada*, former port of Caracas, abandoned in 1587.

Fig. 37.—Caracas; View taken above the Guaire.

Since then the foreign trade of the country has been mainly centred in the port of *La Guaira*, which occupies a narrow shelving rock between the mountains and the deep sea. A few rows of houses, following the windings of the shore-line for some miles, are continued westwards by the palm-groves and villas of *Maiquetia*, and eastwards by the hotels and baths of *Macuto*. Planted thus against lofty cliffs, exposed to a blazing sun, La Guaira, although not unhealthy, is one of the hottest places in the New World, a "hell" like Mascat, and some other "warm corners" in the Eastern hemisphere. Although its mean temperature of 82° to

* Maurice Chaper, *Mission sur la côte nord du Venezuela*.

83° Fahr. is exceeded by that of some spots on the same coast and on the llanos, the heat is rendered more oppressive by its moist atmosphere and sultry nights, when the glass seldom falls more than five or six degrees.

Till recently La Guaira had no harbour of any kind, and in 1821 all but one of the twenty ships riding at anchor in the roadstead were dashed to pieces on the rocks during a fierce storm. But at present a pier and some other improvements afford a little shelter to a few vessels, which here ship coffee in exchange for provisions, furniture, and other wares.

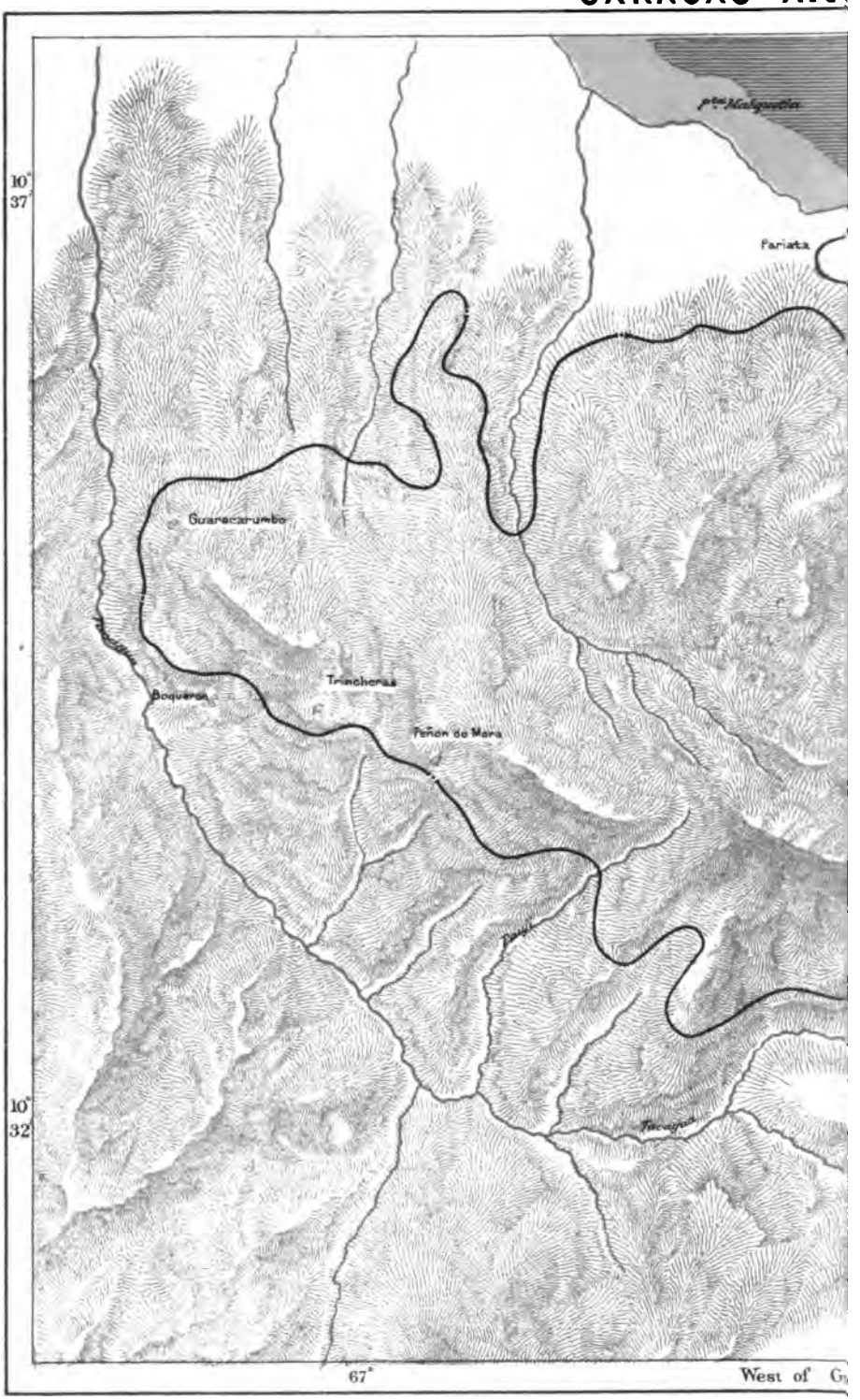
La Guaira is distant only two miles in a straight line from *Caracas*, capital of the republic; but in this short space the route has to scale the Silla heights to an altitude of no less than 3,000 feet. For three centuries a tortuous mule-track was the only link between Caracas and its seaport, and this track is even still utilised during the coffee harvest by most of the surrounding planters. But since 1883 the two places are connected by a railway, 23 miles long, which surmounts the Catia pass, and which has a gradient of about 100 feet to half a mile, and some curves with a radius of not more than 150 feet.

Caracas has preserved the name of the Indian tribe which formerly occupied this upland valley of the coast range. According to the local records the first houses were here erected by Diego Losada in 1567, and in 1595 the settlement was captured and plundered by Sir Francis Drake. Although Caracas stands on somewhat uneven ground, the central parts, at a mean altitude of 3,000 feet, are level enough to be laid out in the usual chessboard fashion. A few public buildings break the uniformity of the city, which is constructed of light and low houses, as a precaution against earthquakes, such as that of 1812, when 12,000 of its inhabitants were buried beneath the ruins.

A reservoir fed by the Rio Macareo supplies sufficient good water to Caracas, which, as the political and intellectual centre of Venezuela, possesses a university, a library, a historical museum, and some hospitals. These advantages, combined with a delightful climate, attract numerous residents, but owing to wars and earthquakes, the population has greatly fluctuated during the present century. It fell from 50,000 before the catastrophe of 1812 to 35,000 about 1850, since which time it has increased to 73,500 in 1891.

Besides the railway connecting it with its seaport, Caracas has a few other lines radiating in the direction of the Atlantic, the Orinoco, Lake Maracaibo, and Colombia. One of these lines, running east to the town of *Petare* and its coffee plantations, will eventually be continued to *Santa Lucia*, on the Rio Tui. Another, crossing the Rio Guaire, and connected by branches with the coal-mines of *Altagracia*, with the Rio Chico, and with *Puerto Carenero*, is intended to cross the llanos in the direction of *Soledad*, on the Orinoco, over against Bolivar. A third line advancing southwards will connect Caracas with the plantations of *El Valle*; while a fourth, ascending south-westwards towards *Antimano* and *Los Teques*, is to be carried by steep inclines, tunnels, and viaducts over the mountains separating the Tui basin from that of the Lake of Valencia. This line, 116 miles long, traverses, at an altitude of about 4,000 feet, one of the most picturesque and

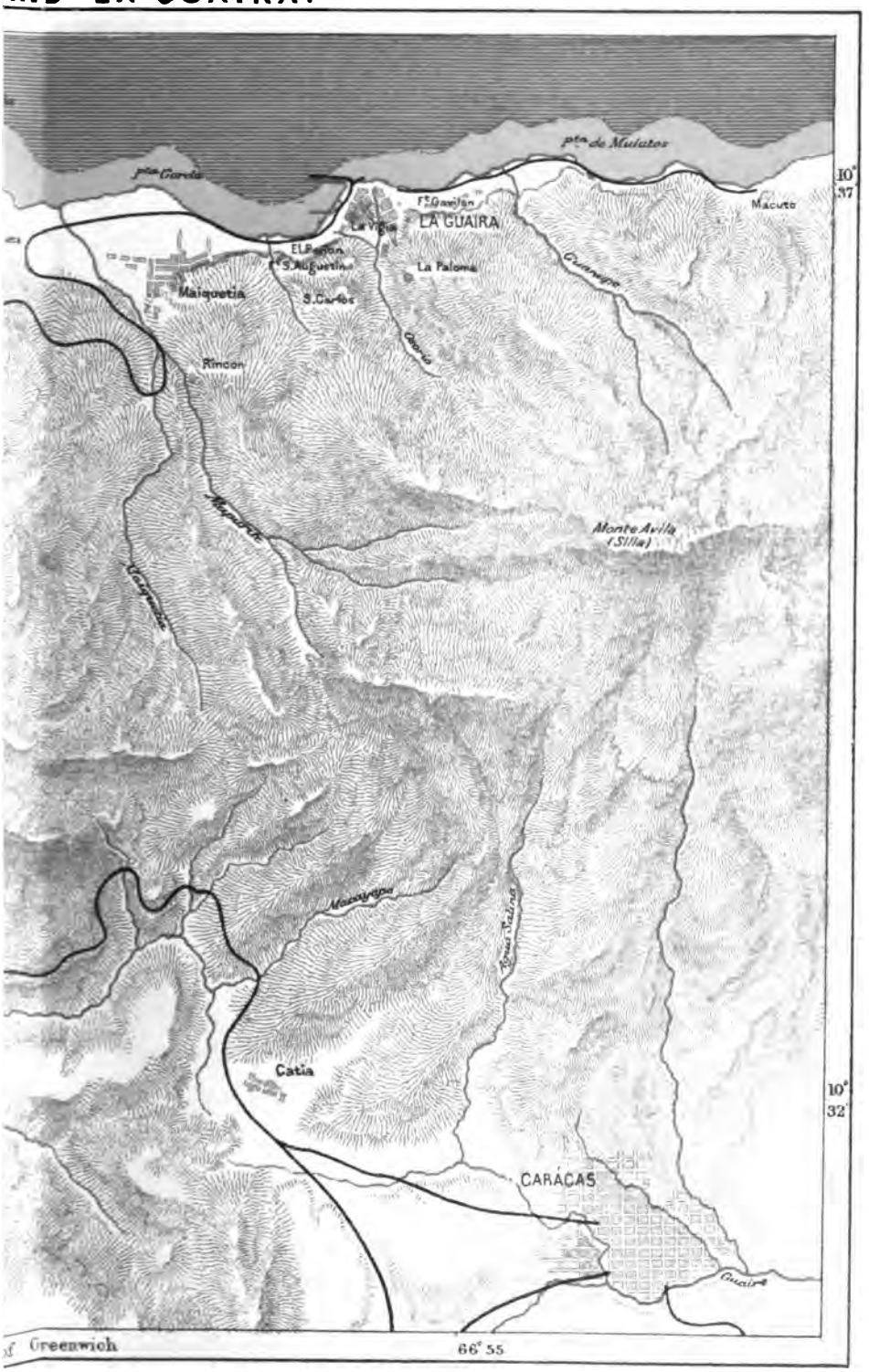
CARÁCAS AN



Depth

0 to 5 fathoms

AND LA GUAIRA.



Depths

5 upwards

salubrious regions in Venezuela, and may one day send a branch to *San Carlos*, in the Apure basin.

The chief agricultural settlements in the republic have been founded in the sierras round about Caracas. In 1843 Codazzi selected a valley of the coast range towards the sources of the Tui (5,900 feet) for his colony of *Tovar*, all of whose settlers were brought from the Black Forest. The speculation promised well at first, but all hopes were dashed by the civil wars, and in 1870 the colony was dispersed by the Venezuelan soldiery. Better success attended *Tagacigua*, another group of agricultural villages, long known under the name of *Guzman Blanco;* it occupies some fertile valleys between the Tui basin and the llanos.

The Aragua Valley, often called the "Valley" in a pre-eminent sense, is the garden of Venezuela, a highly favoured land, where the fertile soil, abundant waters, and an equable climate, less parching than that of the low-lying plains, form an environment admirably suited for the development of plant and animal life. On these plains flourish all tropical species, the cacao, sugar-cane, coffee, banana, indigo, cotton, as well as maize and tobacco. In Humboldt's time wheat was also cultivated, but this cereal has now been driven out of the market by the northern corn-growing regions, and is consequently replaced by the far more remunerative coffee-shrub.

Since the beginning of the century the population of the Aragua Valley has increased more than threefold, and here large towns are numerous. *Victoria*, in the east, occupies the site of the old Caracas Indian mission, but it has little importance, except as an agricultural centre. *Ciudad de Cura*, formerly *Villa de Cura*, standing at an altitude of 1,700 feet on the divide between the Aragua basin and that of the Guarico, flowing through the Apure to the Orinoco, may be regarded as the chief gateway to the llanos. Here are equipped all the expeditions destined for the regions watered by the rivers Portuguesa and Apure.

Maracai—Valencia—Puerto Cabello.

Maracai, on the northern side of the lagoon over against Ciudad de Cura, has perhaps contributed more than any other place to the general prosperity of the country. Its inhabitants, mainly of Basque origin, dispensed from the first with the aid of slave labour, and since then it has always held the foremost position in agricultural enterprise. Not far from its rich neighbour, *Turmero*, on the road to Victoria, is seen a gigantic saman, a member of the mimosa family, whose wide-spreading branches have a circumference of nearly 650 feet. At the advent of the Conquistadores this tree was already held in veneration by the natives for its great size and beauty. Near Maracai and Cura are the highly efficacious hot springs of *Onoto* and *Mariara*, with respective temperatures of 112° and 147° Fahr.

Valencia, capital of the state of Carabobo, lies at the western extremity of the plain flooded by Lake Ticaragua. Founded in the middle of the sixteenth century before Caracas, Valencia occupies a more central position than the present capital, with which it often contended for the first rank. After the separation of

the Colombian republics it was chosen as the seat of the first congress, and although no longer the federal capital, it is still a flourishing city, the second in the republic for trade and population. One of its monuments recalls the battle fought in 1821 on the neighbouring Carabobo plain, which established the independence of Venezuela.

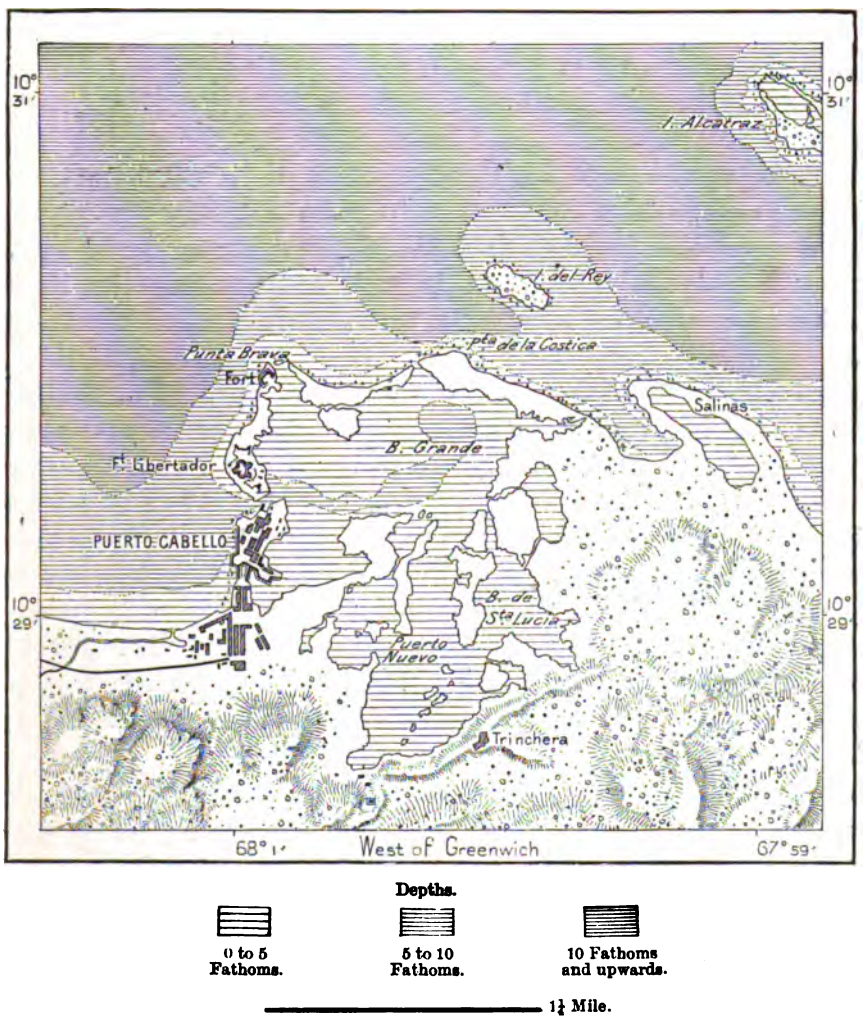
Fig. 38.—Valencia and Puerto Cabello.
Scale 1 : 330,000.

About midway between Valencia and its seaport, *Puerto Cabello*, are situated the famous thermal springs of *Trincheras*, which are amongst the hottest in the world. According to the years and the seasons the temperature varies from 196° to 206° Fahr., at the head of the Agua Caliente, through which these boiling

waters flow to the coast at *El Palito*, a little west of Puerto Cabello. This seaport is connected with Valencia by a railway, which at its highest point attains an elevation of 1,970 feet. According to the local tradition it takes its name of Puerto Cabello ("Hair Port") from the fact that a hair would be strong enough for a vessel to ride at anchor in its tranquil harbour.

The inlet, which ramifies into three irregular basins, is almost completely

Fig. 39.—Puerto Cabello.
Scale 1 : 53,000.



enclosed by a crescent of low islands and banks, leaving only a narrow seaward passage on the west from seven to nine fathoms deep. South of this passage the town occupies a low coralline peninsula, formerly separated from the mainland by another channel, which is now dry land. The harbour is defended by two forts; but the whole district is rendered extremely malarious by the surrounding marshes, shallow and stagnant waters. Dangerous fevers break out, especially

after the rains, when the marine animals are killed by the fresh waters of the Rio San Esteban mingling with the saline coast lagoons. Here also the sharks are much dreaded, although at La Guaira they frighten nobody, and even fly from bathers.* Puerto Cabello exports coffee, cacao, hides, dyewoods, and copper ores.

San Felipe—Coro—Trujillo.

These ores, however, are chiefly shipped at *Puerto Tucacas*, farther west, this place being connected by a railway nearly 60 miles long with *La Luz*, a little east of the mountainous *Aroa* mining district. A large amount of capital has been invested in these copper-mines of Aroa, which are the only works of the kind in Venezuela that have not been abandoned, and which yielded 72,610 tons in 1888. It is proposed to continue the railway towards *San Felipe*, *Barquisimeto*, and other inland towns.

San Felipe, founded in 1551 in honour of Phillip II., is still the capital of the flourishing Yaracui valley, with its extensive cacao and sugar-cane plantations. But it has never quite recovered from the disastrous earthquake of 1812, and at present San Felipe is surpassed in trade and population by *Yaritagua*, which lies near the divide between the basins of the Yaracui and Portuguesa rivers.

Barquisímeto stands at an altitude of about 1,800 feet on the southern slope of this divide, on a rivulet which flows through the Rio Cojede to the Portuguesa affluent of the Apure. This place represents the ancient *Nueva Segovia*, which was founded in 1550, and afterwards displaced. Settlers had been attracted to the spot by the mineral deposits of the surrounding mountains; the mines were held for some years by runaway negroes, who here entrenched themselves, and set up an independent petty state. Barquisímeto has recovered from the catastrophe of 1812, and is now one of the flourishing towns of Venezuela, while *Quibor*, lying to the south-west, has lost its former importance. The Teutonic type is said to persist in Quibor, which was founded by the Germans of Coro, in the reign of Charles V.

There are no large towns in the extensive basin of the Rio Tocuyo, which reaches the coast north of Punta Tucacas and the little seaport of *Chichirivichi*. *Carora*, and the industrious little town of *Tocuyo*, which gives its name to the river, lie a long way from the sea in fertile valleys separated from Lake Maracaibo by the arid plateaux of Agua de Obispo. On this coast there are no harbours or ports except the little village of *Vela de Coro* at the neck of the sandy Paraguana Peninsula, and the beach shoals so gently that large vessels have to cast anchor in the offing two or three miles from the shore.

The western inlet of the Gulf of Coro, on the other side of the sandy Medanos isthmus, is still more inhospitable; yet it was at one time much frequented by shipping, the spot where *Coro* now stands having been chosen as the starting point of the expedition sent to conquer Venezuela. Coro itself was founded by Ampues in 1527, and here the Spaniards were well received by the Indians, who helped

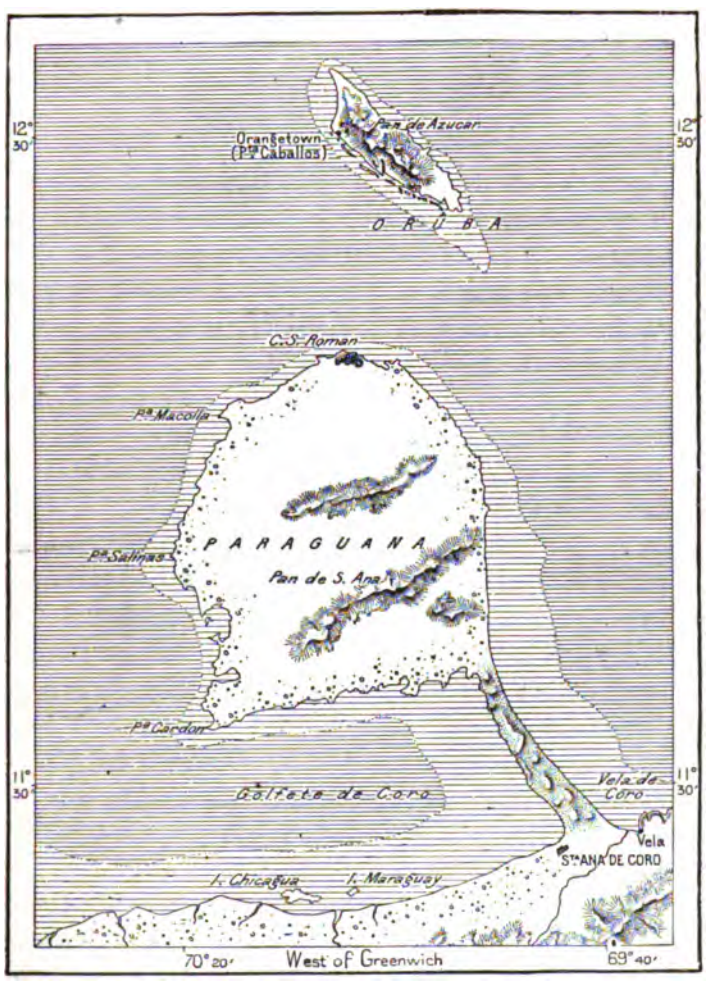
* P. V. N. Myers, *Life and Nature under the Tropics*.

them to reduce the inland tribes; but in their turn they were themselves enslaved.

The German captains, Alfinger, Fredemann, Speier, and Hütten, who had received a roving commission from the Welser traders of Augsburg, started from Coro on the famous expedition which led to the discovery of the Andean plateaux,

Fig. 40.—Coro and Paraguana Peninsula.

Scale 1 : 1,350,000.



of the Orinoco, the llanos, and the Rio Magdalena. Enriched by plunder and raised to the position of capital of Venezuela, Coro naturally attracted the attention of the English rovers, who took it by assault in 1567, and levied a heavy contribution of war on the citizens. To avoid the recurrence of such disasters, the seat of government was a few years later removed to Caracas. Coro is no longer

even a state capital, this distinction having been awarded to the little town of *Capatarida*, situated on the coast midway between Coro and Maracaibo.

Trujillo, standing 2,700 feet above sea-level, at the entrance of an upland valley in the Sierra Nevada range, has shifted its position several times since its foundation in the middle of the sixteenth century. As a mining town surrounded by extremely fertile plains, it attracted corsairs as well as colonists, and was sacked by the pirate Gramont in 1668, when most of the inhabitants took refuge in Merida. An unfinished railway, running through *Mendoza*, *Valera*, *Motatan*, and the port of *La Ceiba*, will eventually connect it with Lake Maracaibo.

Merida—Maracaibo.

Merida, named from the famous city of Estremadura, lies in the heart of the Andes, on the bed of an old lake, where converge several affluents of the Rio Chama, which flows to Lake Maracaibo. It stands at an altitude of 5,450 feet, that is, in a temperate climate, in which European plants flourish side by side with tropical species. Being built of low houses surrounded by gardens, Merida covers a large space on the edge of a perfectly level plateau about 1,000 feet above a narrow gorge of the foaming Rio Chama.

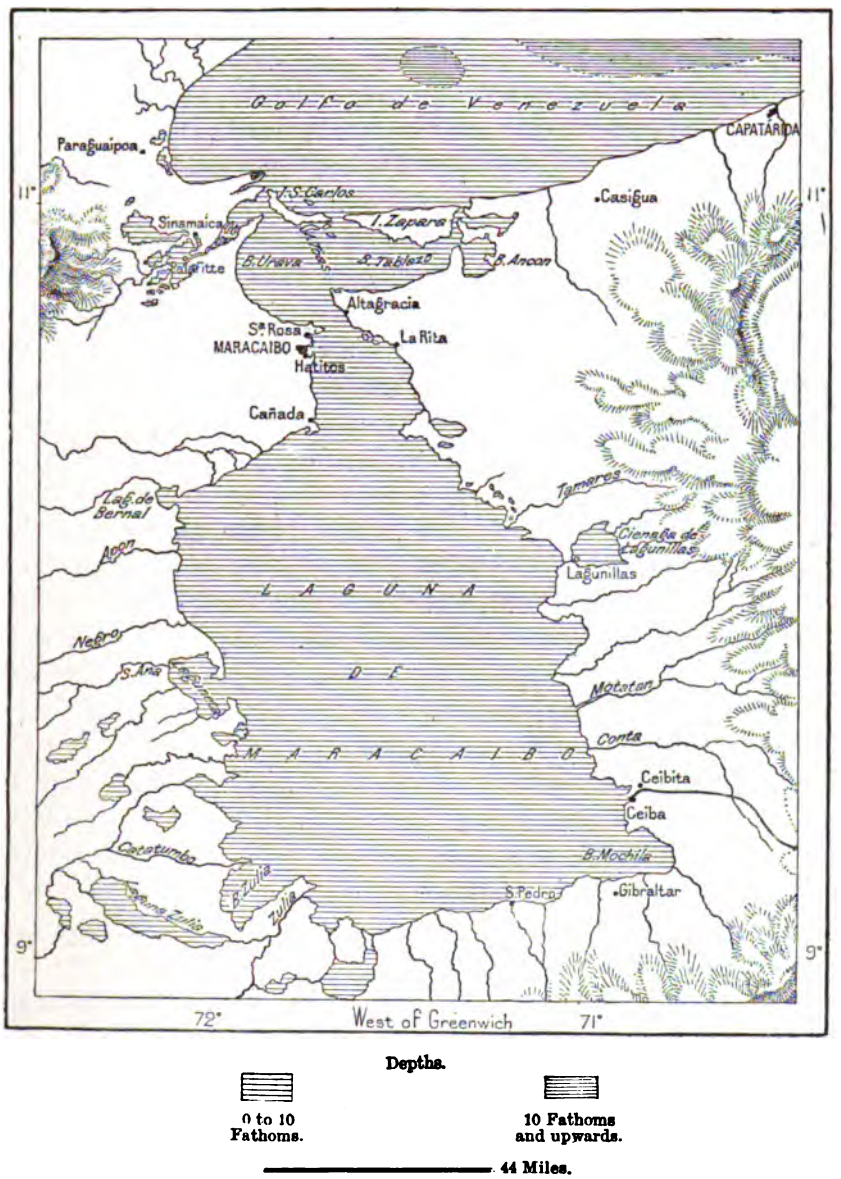
Founded in 1558 under the name of *Santiago de los Caballeros*, Merida still remains to a large extent a Spanish town, although the surrounding valleys are inhabited almost exclusively by half-breeds, sprung from alliances with the old Timotes and Mucuchies tribes. The latter give their name to a town which is the highest town in the republic (9,850 feet). Several villages, however, stand 1,000, 1,200, and even 1,400 feet higher, and one house occasionally occupied dominates all at an elevation of 11,960 feet. Participating in the liberal tendencies of the age, Merida has recently transformed its large ecclesiastical seminary to a university, the only one possessed by Venezuela besides that of the capital. It is proposed to connect Merida by rail with the port of *Zulia*, which lies on a navigable affluent of Lake Maracaibo. Oil-wells have been sunk in the vicinity, and the Indian village of *Lagunillas*, on the road to San Carlos, obtains from a neighbouring lagoon a kind of carbonate of soda used in the preparation of tobacco.

Zulia (San Carlos de Zulia) has given its name to all the low-lying lands dominated by the last chain of the Andes. The river on which it stands, over against *Santa Barbara*, has received the name of Rio Escalante, while farther west flows the true Rio Zulia, which, however, communicates with the Escalante through the Catatumbo, forming a network of channels and a large marshy lagoon known as the Lagon de Zulia. By this waterway Colombia sends its coffee and other produce down to the great market of Maracaibo. The same natural route also connects the Venezuelan towns of *Tovar*, *Bailadores*, and *Grita* with *Maracaibo*.

This place, the *Nueva Zamora* of its Spanish founders, dates from the year 1571, though a first settlement of the same name had been destroyed by corsairs three years previously. It stood on the same beach where the conqueror Alfinger had, in 1529, built some large shelters for the women and children captured

during his plundering and murderous expeditions. Being conveniently situated on the west side of the channel between the Gulf of Venezuela, properly so called, and the inner basin, the settlement rapidly attracted to itself all the trade

Fig. 41.—Lake of Maracaibo.
Scale 1 : 2,200,000.



previously enjoyed by the station of *Gibraltar*, which had been founded on the south side of the lake, but which had been burnt by the pirate L'Olonais in 1668.

Since that time Maracaibo has always remained the commercial centre of the whole of this region, for it commands the outlet of the vast basin comprised between the Eastern Cordilleras, the Santander mountains, and the Sierra de

Perijaa in Colombia. It is thus the natural emporium of the traffic with Cucuta, Pamplona, and the other surrounding markets of the conterminous republic. At present some fifteen steamers ply on the lake and its navigable affluents, and communications must ere long be opened with the middle valley of the Magdalena through the town of Ocaña.

Stretching along the beach amid its fringing coconut-groves, Maracaibo presents a pleasanter aspect seen from the lake than it does to the observer penetrating into its narrow dusty streets winding between high houses. It is extended southwards by the fashionable suburb of *Hatitos*, residence of its wealthy merchants, who export coffee, cacao, dyewoods, cattle, hides and drugs in exchange for English, French and German wares, and Spanish wines.

Large vessels being unable to pass the channel, Maracaibo intends to create an outer harbour in deep water by constructing a railway to the village of *Cojoro* on the Colombian frontier. *Santa Rosa*, near Maracaibo, is still a lacustrine village, erected on piles in the midst of the waters, and resembling the settlements from which the whole country received the name of Venezuela. Similar groups of lake dwellings are seen in the Sinamaica lagoon, and in the south-east corner of the inner basin.

The llanos which stretch south-east of the snowy Merida range, within the triangular space formed by these mountains and the Apure and Portuguesa rivers, are relatively better peopled than the plains lying farther east. Here are a few flourishing agricultural centres, such as *San Cristobal*, on the Torbes affluent of the upper Apure, and the neighbouring *Tariba*, *Rubio*, and *Capacho Nuevo*; all of these places, however, belong commercially and even socially to the Maracaibo basin, forwarding their produce, such as coffee, sugar, cacao, cattle, and petroleum, not to the Orinoco, but to the coast, by the Cucuta railway, running through Colombian territory.

The hilly district of Tachira, so named from the frontier river towards Colombia, has been rapidly peopled and enriched, thanks to its fertile valleys, which present a striking contrast to the extremely arid hills and plateaux encircling them. Towns, such as Rubio, have sprung up quite recently in the very wilderness, while others, such as *San Antonio de Tachira*, have recovered from the disastrous earthquake of 1875.

Varinas (*Barinas*), formerly a provincial capital, but now decayed, gives its name to a tobacco of excellent quality, very little of which, however, is grown in this part of the llanos. *Guanare*, the present state capital, stands on the high banks of the Rio Guanare, an affluent of the Portuguesa. In the same basin are the prosperous little towns of *Bejuma*, *Miranda*, *Nirgua* (one of the first Spanish settlements), *San Carlos* (a former Indian mission), *Cojedes*, *Acarigua*, and *Pao*.

Farther east *Calabozo*, founded in the last century by the Guipuzcoa (Basque) Company, crowns a hill 500 feet high, encircled by a bend of the Rio Guarico. Thanks to this relatively elevated position, and to the absence of marshy tracts, Calabozo has always been the most healthy place in the llanos. Before 1868 it

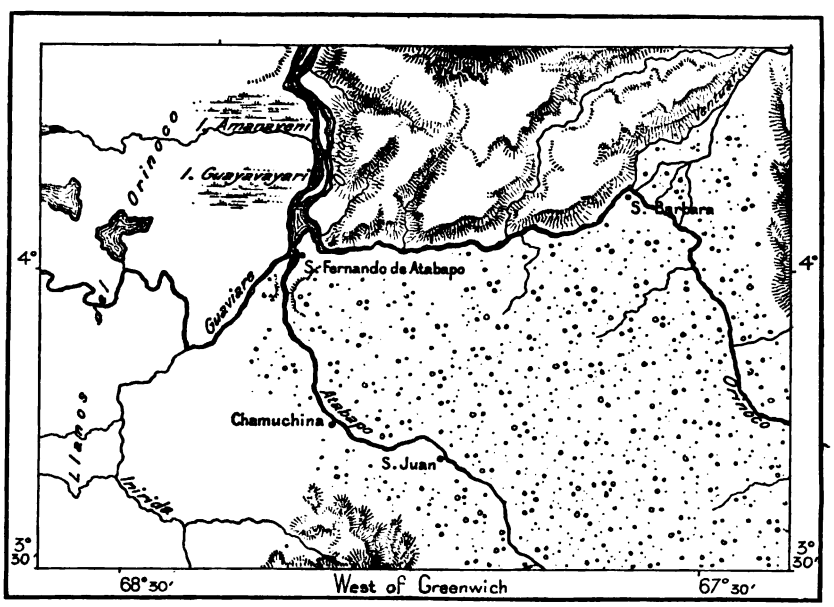
LAKE DWELLINGS OF SANTA ROSA, NEAR MARACAIBO.

was one of the most flourishing places in the republic; but it lost half its wealth and population in the civil war, which long ravaged this region. The seat of government for the state of Guarico was also removed from Calabozo to the far inferior town of *Ortiz*, which, with the neighbouring *Parapara*, commands the northern approach to the llanos at the foot of Mount Galera.

San Fernando occupies a position of vital importance on the right bank of the Apure, opposite the mouth of the Rio Portuguesa. Here it commands the converging point of four navigable streams, on which steamers ply in one direction to the port of *Nutrias*, beyond Ciudad Bolivar, in another up the Portuguesa to *El Baul*. But the whole region is so sparsely peopled that the trade of San Fernando still remains undeveloped, although it has taken the place of *Achaguas*

Fig. 42.—Ramifications of the Atabapo.

Scale 1 : 1,400,000.



as a district capital. Achaguas, a former Indian mission, lies to the south-west, in the labyrinth of channels and backwaters separating the Apure from the Arauca.

San Fernando de Atabapo—Bolivar.

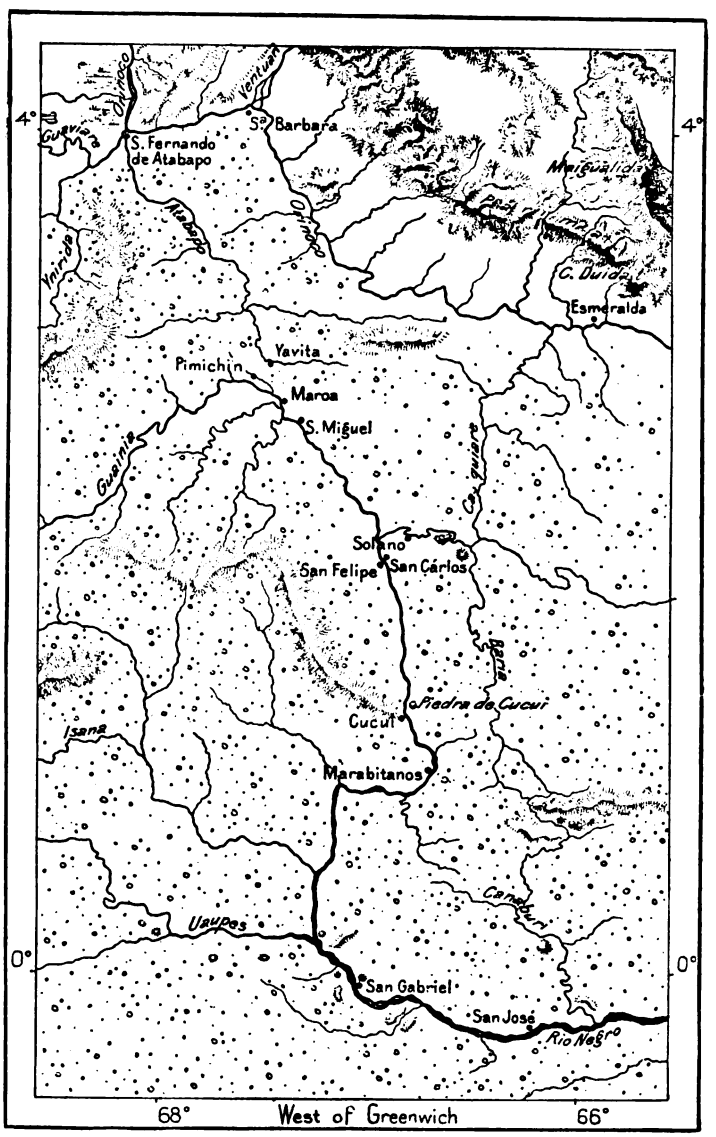
In the upper Orinoco valley, and on the divide between that river and the Rio Negro, there are no centres of population beyond such wretched hamlets as *Esmeralda*, *Yavita*, and *Pimichin*, frequently mentioned in books of travel, because of their position at important confluences or portages.

At the confluence of the Atabapo and Orinoco, 776 feet above sea-level, *San Fernando de Atabapo*, founded by Solano in 1757, occupies even a more important position than San Fernando de Apure. From this point radiate as many as six navigable highways, southwards by the Atabapo to Brazil, east-

wards to the upper Orinoco, north-eastwards to the Ventuari, northwards to the middle Orinoco, westwards by the Guaviare to Colombia, and south-westwards to the Inirida basin. But so insignificant is the local traffic

Fig. 43.—Ramifying Streams on the Brazil and Venezuelan Frontiers.

Scale 1 : 4,000,000.



that the 500 inhabitants of San Fernando suffice for all its present requirements.

The old Indian settlements, which give their names to the *Maipures* and *Atures* rapids, have all but disappeared. Maipures, standing on the left bank of the Orinoco, is now included in Colombian territory, although the tow-

GENERAL VIEW OF CIUDAD BOLIVAR.

path and portage remain free to both nations till the year 1911. Of *Uruana* (*Urbana*), the old Otomak mission, nothing remains except a few stakes stuck in the ground, and a half-charred cross.

Caicara is favourably situated near the great bend of the Orinoco, below the Apure and Apurito confluences. Here are exchanged manufactured goods for the cordage made of Chiquichique palm fibre (*attalea funifera*), stout hammocks of the mauritia palm, and especially the tonka or sarrapia bean (*dipteryx odorata*), collected in the Cuchivero valley, and used in Europe for imparting an aromatic fragrance to tobacco.

Fig. 44.—Maipures and Atures Rapids.
Scale 1 : 600,000.

For a distance of 250 miles below Caicara, all the way to *Ciudad Bolivar*, there are no centres of population except a few obscure hamlets on the banks of the Orinoco. Bolivar itself, present capital of Venezuelan Guiana, has frequently changed its position since its foundation by the Jesuits on the right bank at the mouth of the Caroni in 1576. In 1591, *Santo Tomé*, as it was then called, was moved some 10 leagues lower down to a spot on the right bank at present indicated by the station of *Guayana Vieja* ("Old Guiana"). It had previously been attacked by the Dutch, and now it was reduced to ashes by the English under Sir Walter Raleigh. In 1764 the administrative centre was again shifted 94 miles higher up to the narrows, where the Orinoco is confined to a bed less than 800 yards wide. Hence its new name, *Angostura* ("The Narrows"), which gradually replaced Santo Tomé, and was itself changed to Ciudad Bolivar, or simply Bolivar, in honour of the "Liberator."

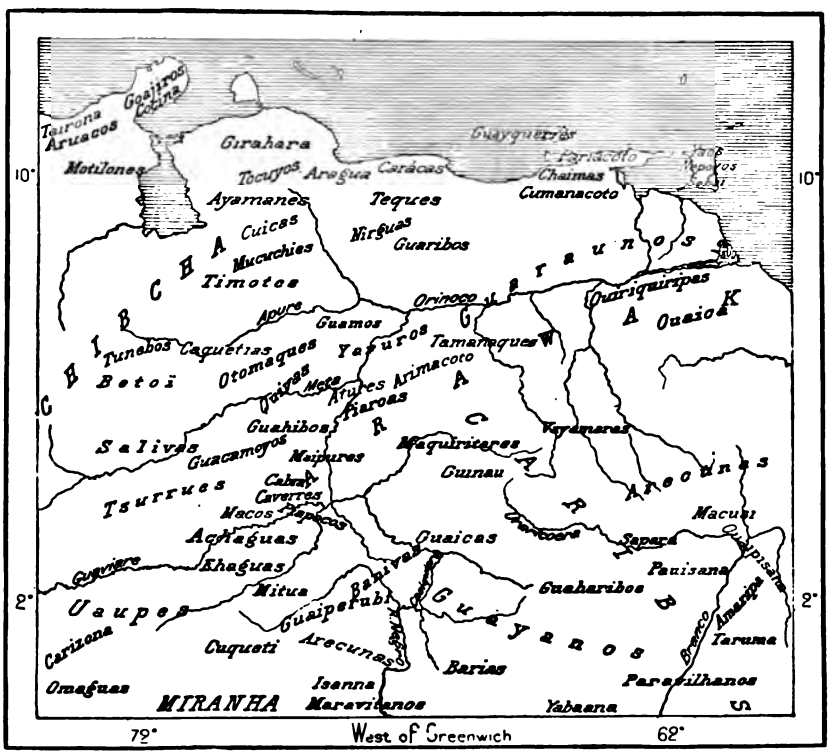
Bolivar extends west and east along the right bank between the negro quarter, *Perro Seco* ("Dry Dog"), and the elegant suburb of *Alameda*, which, however, is exposed to frequent inundations. In mid-stream rises the black-pointed *Piedra*

del Medio ("Middle Rock"), which serves as a natural fluviometer, to measure the periodical rise and fall of the flood waters. On the left bank stands the growing suburb of *Soledad*, future terminus of the projected Caracas-Bolivar railway, and already the centre of a brisk trade, carried on especially with Calabozo and Varinas. One of the chief local industries is the manufacture of cigars, mostly in the hands of Germans.

Sailing-vessels have been almost entirely replaced by steamers which ascend the Orinoco with the tides as far as the narrows at Bolivar. The movement of exchanges is mainly with Port of Spain in Trinidad, which may be regarded as the

Fig. 45.—Aborigines of Venezuela.

Scale 1 : 1,600,000.



seaport of Bolivar, the chief intermediate station being *Barrancas* (*San Rafael*), at the head of the Orinoco delta.

The local traffic has much increased since 1840, when Plassard discovered the auriferous quartz reefs in the valley of the Yuruauri, a tributary of the Cuyuni affluent of the Essequibo. These mines, which are approached either from *Puerto Tablas* at the Caroni confluence, or from the populous town of *Upata*, or else from Guayana Vieja, are dotted over numerous depressions on the southern slope of the Sierra Piacoa. The Caratal group at *El Callao* yielded over £800,000 annually during the years 1884-6, and the total output from 1866-89 was valued at £8,300,000. But since that time the yield has considerably fallen off.

In the magnificent savannas watered by the Caroni there are no longer any permanent settlements, although the Capuchin friars from Catalonia had here founded over thirty missions. Of these stations nothing remains except a few ruins, such as those of *Grior* (*Gurior*), at the foot of the Sierra Pacairama, near the Brazilian frontier.

Nevertheless, several tribes that have reverted to the wild or free state still call themselves Catholics, and wear round their necks crosses, medals, sometimes even little pouches full of relics. Such are the Quiriquiripas, a group of sedentary agriculturists, who have established themselves on the southern banks of the Orinoco and neighbouring affluents. Like the Ariguas of the Caura basin, who, however, still tattoo their faces, the Quiriquiripas have retained the costume received from the missionaries—a long loin-cloth for the men, a folded skirt for the women; some of their songs, also, are echoes of the former hymns and prayers.

But farther on the uplands are occupied by many still savage tribes, Caribs and Arawaks, who go naked, daub face and body, deck themselves with feathers and claws, and wield darts dipped in the deadly curare poison. In their midst the traveller recognises the ancient Venezuela, such as it appeared to Ordaz, Alfinger, and the other pioneers of conquest and discovery.

V.

Material Condition of Venezuela.

No regular census has been taken of the Venezuelan population, and several of the past official estimates appear to have been obtained by extremely rough processes. Nevertheless, there can be no reasonable doubt regarding the steady increase reported from decade to decade since the War of Independence, by which certain regions had been depopulated. The exaggerations pointed out by various travellers are due to the fact that the official documents occasionally attribute to the chief towns the population of whole districts, so that certain obscure villages figured in the returns as populous cities.

According to Humboldt the whole nation, including negroes, half-breeds, and Indians, numbered in 1810 about 800,000, which was reduced by the official statements to 660,000 in 1825, that is, soon after the terrible struggle for freedom. Since that time the subjoined table shows that the growth of the population has never been interrupted by internal revolutions or other calamities.

	Inhabitants.
1839 (Codazzi's estimate)	945,348.
1854 (Official number)	1,564,433.
1874 (Official estimate)	1,784,194.
1892 (Official estimate)	2,238,900.

The estimate for 1893 may be put at 2,250,000, and even this should be increased by some 80,000 were it to include the territories till recently claimed by the republic north of the Gulf of Venezuela, west of the middle Orinoco, and on the left bank of the Essequibo, territories still included in the administrative valuations. Uncertainty prevails especially as regards the pure indigenous element, which is at present estimated at over 325,000, of whom 240,000 are

classed as "civilised," 20,000 settled, and upwards of 60,000 still independent in the mountain forests and on the llanos.

After a sanguinary civil war the returns for the federal district showed a proportion of 128 women to 100 men in 1873, but since then the equilibrium of the sexes has been restored, and in 1881 there was an excess of less than 70,000 women in the whole population. Despite wars, massacres, yellow fever, and other epidemics the birth-rate has always exceeded the mortality, if not from year to year, at least from decade to decade.

On the other hand immigration has contributed little to the general increase, not more than 4,537 in the seven years ending 1887; even in 1889, when the number rose to 1,555, there was a proportionate increase of emigrants. Foreigners are at present estimated at about 40,000, of whom over one-fourth are Spanish Basques; then follow the English and people of Trinidad, the Italians, Dutch from Curaçao, French and Germans in the order given.

Agriculture—Stock-breeding.

Being essentially an agricultural and pastoral land, Venezuela yields an abundance of the first necessaries both for the local demands and for a considerable export trade. As in Jamaica and most of the Antilles, the emancipation of the slaves involved the ruin of a large number of planters, and the division of vast domains into relatively small holdings worked by free labour. Nevertheless, the large landowners have in many places endeavoured to replace the blacks, on whom they could no longer depend, by full-blood or half-caste natives. By reducing these labourers to a disguised servitude, they have managed to work their plantations at a profit, without being driven to the necessity of introducing East Indian or Chinese coolies, as in Trinidad or Demerara. A few hundred European settlers have been attracted by the grant of little farms of fifteen acres, as at Taguacita, in the uplands south of the Tui basin. Here a colony of over 1,500 persons was engaged in 1888 in the production of coffee, cacao, and sugar. There being plenty of land to dispose of, the terms are very tempting, free tenure for three years, and then nothing but licence and surveying charges.

After maize the chief economic plant is coffee, which on favourable grounds yields 360-fold and four annual crops. The first coffee plantations were established in 1784 in the neighbourhood of Caracas, and the shrub thrives best on the uplands of the temperate zone, where the foliage is moistened by frequent and heavy morning dews. Cacao, which had long been neglected, although the first colonial product exported from Venezuela, is again coming more and more into favour. Few other regions are more suited for the cultivation of this plant, which grows wild in certain parts of the Merida uplands. Sugar, which ranks third in importance, is grown chiefly on the hot, alluvial lowlands, and especially on the marshy plains encircling Lake Maracaibo. Tobacco is treated in two ways, the *cura negra* ("black preparation") for local consumption, and the *cura seca* ("dry preparation") for exportation. A tobacco juice is also prepared with nitre, which is extremely rich in nicotine; by rubbing it on the gums the working

classes obtain strong narcotic effects. Other vegetable products, such as the tonka bean, rubber, sarsaparilla and copaiba, are nearly all gathered in the wild state. Locusts are the chief plague of the peasants, especially on the Cumana seaboard and on the verge of the llanos.

It seems probable, from the successful efforts already made to bring the llanos under cultivation, that these vast plains may one day be transformed to tilled land. But hitherto they have been utilised mainly as cattle-runs. The stock is subject to tremendous vicissitudes due to the incidence of wars, droughts, epidemics, and other calamities. Thus it was reduced from at least 5,000,000 to less than 1,400,000 during the decade ending 1873, by the protracted civil wars and plundering expeditions of that disastrous epoch. On the other hand there was an enormous increase in 1888, when the horned cattle numbered nearly 8,500,000, or about four to every inhabitant of Venezuela. Such a proportion exceeds even that of Denmark, which has relatively the largest number of any state in Europe.

Extensive as it is, the land under tillage and grass represents only about half of the republic, the rest consisting of forests which at present yield nothing but fruits, rubber, fibres, and drugs. But in the neighbourhood of Bolivar, and along the route followed by the steamers plying between that place and Trinidad, the demand for fuel has already made serious inroads on the woodlands. The woodman's axe has also begun to attack such trees as are useful as timber, or for cabinet-work. In all the north-western districts near the seaports the inhabitants have long been felling the dyewoods and the *dividivi*, which, being rich in astringent principles, is highly valued by the European tanners.

Despite the abundance of animal life in the Margarita waters, and in the Apure and some other rivers of the llanos, the fishing industry remains in a very backward state. The pearl-banks in the Margarita Archipelago are all but exhausted, and the total annual value of the Venezuelan fisheries averages scarcely more than £300,000.

Mineral Wealth—Industries.

Although rich in metals, Venezuela is far surpassed by all the other Andean republics, except Ecuador, in the production of minerals. It yields little to commerce besides the copper of Aroa and the gold of Yuruauri, although it possesses rich stores of lead, tin and especially iron. A few coalfields are worked, as well as pitch-lakes like those of Trinidad, occurring in lands of similar formation near the Orinoco delta and round the shores of Lake Maracaibo. Phosphates of lime and guanos have been discovered on the seaboard, in the adjacent islands and round the verge of the llanos. Natural salines have also been formed in all the coast lagoons, where they are separated by strips of sand from the sea. The annual yield of all the saltpans is estimated at 100,000 tons, valued at over £40,000 in favourable years.

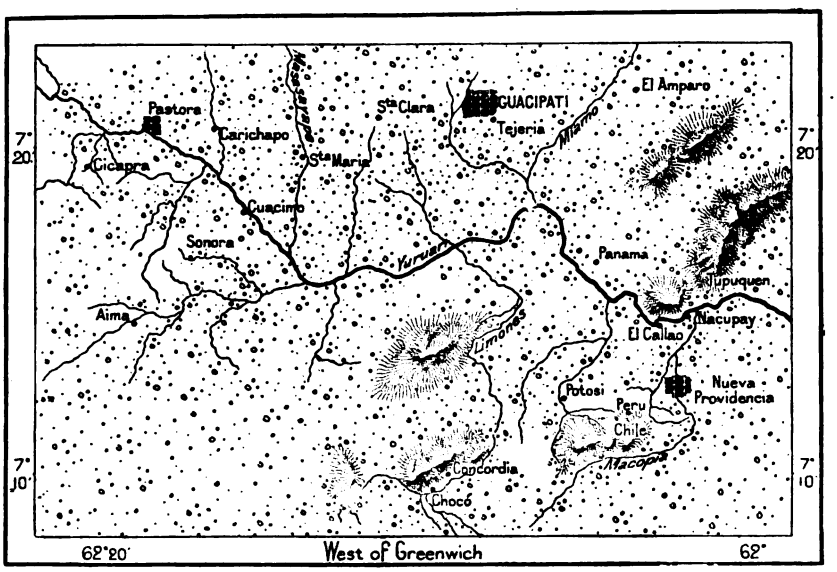
Manufacturing industries, properly so called, can scarcely flourish in a land like Venezuela, whose rural populations have no need of luxuries. They are satisfied with palm-thatched cabins, whose floors are of beaten earth, and whose furniture is limited to rough tables hewn in the neighbouring forests, a few chairs

"upholstered" in ox-hide, and hammocks bartered for with some passing Indian. The clothing, also, is often at least partly the product of native industry. Various vegetable fibres are used for making straw hats, greatly inferior, however, to those of Colombia, and for weaving *cobijas* similar to the Mexican *ponchos*. Close to every hut grows the calabash-tree, yielding an unlimited supply of ready-made household utensils, and even musical instruments. In these *maracas*, as they are called, the llaneros enclose a few grains of maize, flourishing them about in tune with the mandoline at their dances and concerts. The wealthy classes, however, need something more than this, and their requirements are met by the foreign importers.

Under the Spanish regime the trade of Venezuela was monopolised by the historical "Guipuzcoa" Company. The transactions of this society led to the

Fig. 46.—Yuruauri Gold-mines.

Scale 1 : 425,000.



first revolt in 1749, when Juan Francisco de Leon advanced at the head of 9,000 men to drive the company's people from Caracas. Under more liberal regulations the business of the country has increased tenfold since 1830, a rate of increase far surpassing that of the population. But in this increase Spain, which formerly excluded all rivals, now takes the least share, ranking not only after Great Britain, the United States, France and Germany, but even after Colombia and the British colony of Trinidad. England, which formerly stood first, now takes the second place next to the United States, whose exchanges were nearly doubled during the decade between 1880 and 1890, thanks to the new line of steamers now plying between the two republics. In return for cacao, skins, copper ores, timber, phosphates and especially coffee, Venezuela takes from the United States cottons, flour and salt meat.

Communications.

The coasting trade carried on between the Venezuelan ports adds about £4,000,000 to the total of the annual exchanges. In 1888 nearly 13,000 vessels of over 2,000,000 tons, including 927 steamers, entered and cleared from these ports, and the traffic of the republic with the Antilles, North America, and Europe already suffices to support nine regular lines of steamers.

But the development of the inland communications must tend to increase the general movement of commerce far more rapidly than the expansion of its foreign trade. Even recently the so-called highways were for the most part mere paths, by-ways or the broad beaten track of animals crossing the llanos. But now, as

Fig. 47.—La Guaira; View taken at Carvonal.

in so many other newly-settled lands, the people are beginning to develop a railway system before they have had time to build ordinary roads. A first line, boldly constructed up a steep incline and following the windings of savage gorges, connects the capital with its port of La Guaira. Another, scarcely less indispensable, puts Valencia and its rich plantations in direct communication with Puerto Cabello.

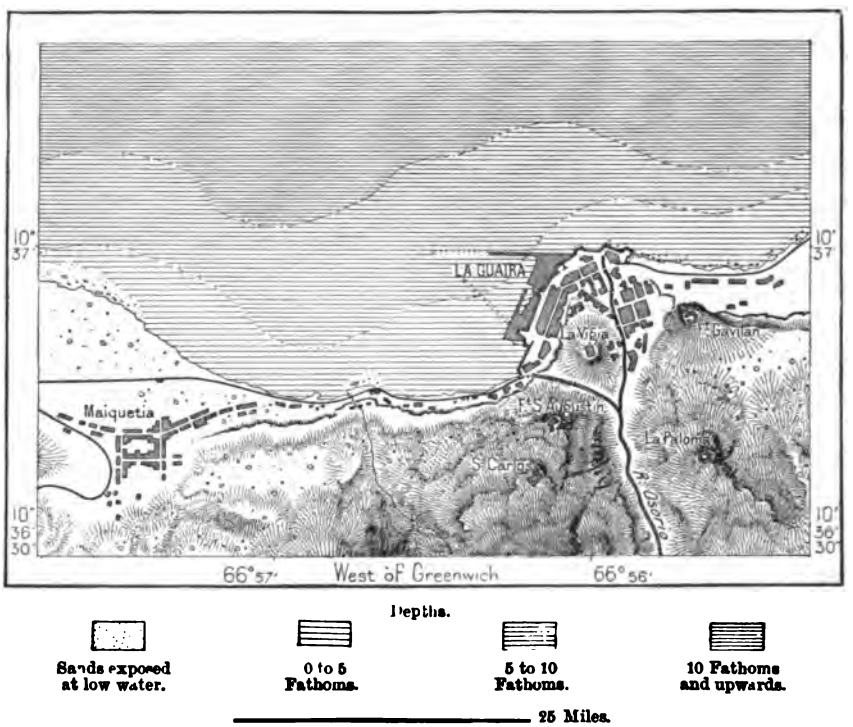
Other ports, such as Guanta, Carenero, Tucacas and Ceiba, are connected with inland towns by various branches of a far from completed network. Unfortunately the progress of the trunk line, which is to effect a junction between the two chief seaports and the two cities of Caracas and Valencia across highly productive cacao and coffee plantations, has been interrupted by another civil war (1892-3).

The telegraph system already connects all the towns of the republic with the rest of the world through the submarine cable which has its land terminus at La Guaira. The various local lines, employed chiefly in the service of the administration, are a heavy burden on the Treasury, owing to the backward state of education and of commerce. In 1888 the returns showed only one despatch for every five, and one letter for every two persons, a proportion inferior even to that of Russia.

The first printing-office and the first newspaper date only from the year 1808, just before the outbreak of the War of Independence. Serious publications are still rare, but periodicals, mostly short-lived, have greatly multiplied. According

Fig. 48.—La Guaira.

Scale 1 : 25.000.



to the law, primary instruction should be "gratuitous and obligatory," yet scarcely a twentieth part of the population attends the schools.

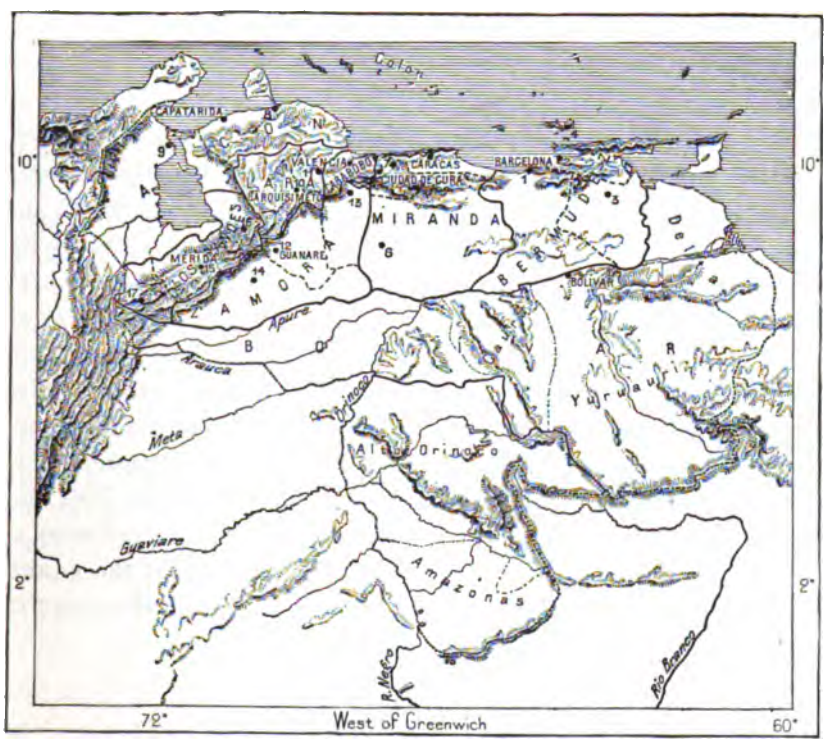
Three high schools, those of Caracas, Merida, and Maracaibo, have been raised to the rank of universities, but that of Caracas alone, founded in 1822, has any claim to the honour—at least, since the middle of the century. Merida, a small town lost amid the mountains, has too few resources for its university to support a staff of professors Hence most of the young men intended for the liberal professions still continue to resort to Caracas. The lawyers, doctors, and especially "politicians," who have graduated at this institution, are reckoned by the hundred, and many of these have completed their studies in Paris, or in other European universities.

Administration.

According to the text of the fundamental statute, Venezuela is constituted a federal republic, "popular, elective, and responsible." In 1893 it comprised eight states, the federal district of Caracas, various territories and colonies dependent on the central government. Each state is autonomous, with separate administration of justice, legislative body, and president—in fact, all the machinery of administration on the model of the supreme government. This central system is itself modelled on that of the United States, the national Congress consisting

Fig. 49.—Political Divisions of Venezuela.

Scale 1 : 16,000,000.



• Federal District.

Limit of Present States. Limit of Former States. Limit of Territories.

Names of the former State Capitals: 1, Barcelona; 2, Cumana; 3, Maturin; 4, Asuncion (Nueva Esparta); 5, La Guaira (Bolivar); 6, Calaboso (Guarico); 7, Victoria (Aragua); 8, Coro (Falcon); 9, Maracaibo (Zulia); 10, Barquisimeto; 11, San Felipe (Yaricui); 12, Guanare (Portuguesa); 13, San Carlos (Cojedes); 14, Varinas; 15, Merida; 16, Trujillo; 17, San Cristobal (Tachira).

310 Miles.

of two houses, the Senate with 24, and the House of Representatives with 52 members. The electors—that is, all men over 18 years of age—nominate one deputy for every 35,000 inhabitants, and one over for an excess of 15,000 in each state. Both the deputies and the senators, who are nominated by the several state legislatures, are elected for a period of four years. There is also a federal council of 19 members appointed by the Congress every two years, and empowered to choose a president from its own members, who is also president of the republic.

The same body chooses the vice-president, who, under certain circumstances, may replace the president either for a time or absolutely. The executive is exercised by eight ministers (interior, *fomento* or "*progress*," instruction, board of works, finance, credit, war, and foreign affairs), all responsible to Congress, whose decrees cannot be vetoed by the president.

The revenue, derived chiefly from customs, ranges from £1,600,000 to £1,800,000, but is insufficient to meet the expenditure, so that the national debt is gradually increasing. Although religious tolerance is guaranteed, the "Roman Catholic and Apostolic" State Church alone enjoys the privilege of holding public processions and other outward displays. The hierarchy comprises three members only of episcopal dignity—the Archbishop of Caracas and the Bishops of Merida and Bolivar.

In 1891 the standing army stood at 5,760 men of all arms; but during the frequent civil wars the militia—that is, all men between 18 and 45 years of age—are liable to serve. This force is estimated at 250,000, but not the tenth part has ever been induced by bribes, hope of plunder, or by more forcible means to take service with either faction. Another fiction, carried further than in any other state, is that of the military staff, which in 1889 comprised no less than 7,032 generals. The official census of the state of Carabobo for 1875 returned nearly one-seventh of the male population above 21 years as "superior officers." It appeared, in fact, that Carabobo, with about 170,000 inhabitants, had at its disposal 449 generals, 627 colonels, and over 2,000 other officers, but no troops.

The territorial divisions shift their borders with every revolution, and have consequently no permanent value. A vote of Congress, however, has recently decreed the re-establishment of the 21 original states, which in 1881 had been merged in eight political divisions and a certain number of territories, some of which have since been surrendered to Colombia in virtue of the award of the Spanish arbitrators. In the Appendix is given a tabulated statement of these divisions, taken from official documents.

CHAPTER IV.

COLOMBIA.

THE republic at present known by the name of Colombia, and till recently variously designated as New Grenada and the United States of Colombia, comprises a vast domain at the north-west corner of the continent, together with the intercontinental isthmus as far north as Costa Rica. The Atlantic and Pacific coastlines have each a development of about 1,530 miles, while the land frontiers may be approximately estimated at 1,250 miles, pending a final settlement of the disputed question of boundaries with the conterminous states. At the extreme north-west the limit of the Panama district towards Costa Rica awaits the decision of the arbitrators charged with the study of the early records preserved in the Spanish archives.

The frontier towards Venezuela has already been determined by the arbitration of Spain; but with Brazil, Ecuador and Peru the question is still in a backward state, some of the interested powers claiming vast spaces in the almost uninhabited wilds of the Amazonian slope. But even apart from these disputed and, at least for the present, almost valueless lands, Colombia still remains a very large state, with a superficial area that can scarcely be estimated at less than 500,000 square miles.

The true Colombia, however, regarding it from the standpoint of the general relief and more characteristic physical features, comprises no more than about half of this domain, that is to say the ramifying Andean system with its intermediate valleys. Were the international frontiers to be determined, not by musty and often contradictory documents, but by the broad natural divisions, Colombia should certainly have retained the Sierra de Merida, as well as the whole of the Maricaibo basin, leaving to Venezuela the Orinoco, with all its affluents. Towards Ecuador, also, where the limits on the seaboard are indicated by the little Rio de Matajé (Pillanguapi), the frontiers are for the most part artificial, traversing plateaux and mountains with little regard to the geographical and ethnical conditions. Its south-eastern plains being mostly almost uninhabited, Colombia as a whole is but sparsely peopled, although certain regions of the plateau already

resemble West Europe in the density of their population. In 1892 the actual population was approximately estimated at 4,200,000.

Progress of Discovery and Conquest.

The name of Colombia is so far justified by the fact that Columbus really visited its shores between the Chiriqui lagoon and the San Blas Islands; but he never sighted the mainland stretching from the Gulf of Uraba to the Goajiros peninsula. This section of the seaboard was first coasted by Bastidas and his pilots, who, however, formed no settlements, nor did Hojeda and his companion Vespucci push farther west than the headland of Cape de la Vela. The isthmian region where Columbus had found the gold which earned for him the title of Duke of Veragua, and which was known to be limited southwards by another ocean, proved much more attractive to the Spanish adventurers. In 1513 Nuñez de Balboa had already crossed the isthmus in 23 days, thus discovering the South Sea, and tracing a clear route between the two oceans, from Puerto Bello to Panama. Vessels were now launched on the Pacific waters to explore the seaboard, in one direction towards Mexico and California, in another towards Peru, the Biru of legendary reports.

Pascual Andagoya was the first to coast the shores of New Grenada, returning to Panama in 1522, with fresh news of the land of gold; two years later Francesco Pizarro and his associates, Diego Almagro and Hernando de Luque, were already organising expeditions of conquest. Pizarro himself advanced but a short distance along the coast, where he had to struggle with the natives and with famine; but Almagro penetrated over 300 miles southwards to the mouth of the Rio San Juan, that is to say, the river whose valley indicates, with that of the Atrato, the true geographical limits of the southern continent.

In 1526 the Spanish pioneers continued to advance along the Pacific coast southwards, and at last, after numerous misadventures, passed the limits of the present Colombian seaboard, reaching the Bay of Guayaquil, and landing at Tumbez on Peruvian soil in 1527.

The marvellous adventures of Cortez and Pizarro necessarily threw into the shade the lands immediately south of Panama, although even this region was known to abound in the precious metals. But after the conquest of Peru a backward movement set in, resulting in the invasion of the Colombian plateaux of Tuquerres, Antioquia, and Cundinamarca by bands of adventurers starting, some from Venezuela, some from Ecuador. The coastlands, however, were also visited at an early date, and after a first disastrous expedition, made in 1508, from the shores of the Gulf of Uraba, the Spaniards had already gained a permanent footing on the Colombian seaboard in 1525, when they founded the city of Santa Marta, not far from the Magdalena delta, but the settlers were not numerous enough to extend their expeditions beyond the Sierra Nevada and surrounding valleys.

Thus it happened that the first serious expedition, or rather plundering and murderous campaign, in the interior, started not from the coast, but from Venezuela in the year 1530. Armed with the mandate of Charles V., authorising

OLD SPANISH FORTIFICATIONS AT PUERTO BELLO.

the adventurers to enslave all refractory natives, Ambrosius Alfinger aimed at nothing beyond the discovery of gold-mines, and the capture of "rebellious" Indians to be sold at the slave-market of Coro. After crossing the Perijaa mountains, west of the Maracaibo basin, he burst into the Upar Valley, plundering and burning the habitations, slaying the old and infirm, kidnapping all the marketable men and women, the mere report of his atrocities dispersing most of the tribes to the surrounding highlands. After these exploits he traversed the Sierra de Tairona, reaching the banks of the Magdalena by devious tracks. Here he pushed southwards down the Lebrija valley, crossing the Velez mountains with the intention of returning to Venezuela by the paramos and intervening valleys. But he never reached his destination; overtaken by the Indians, he perished near Chinacota, between Pamplona and Cucuta, on the spot which has preserved his name, Miser Ambrosio. Few more murderous expeditions were ever led by any lawless adventurer.

After obtaining the concession of "New Andalusia," that is to say, the whole territory comprised between the mouths of the Magdalena and Atrato, Pedro de Heredia, governor of Santa Marta, undertook in his turn the conquest of the lands assigned to him by Charles V. In 1533 he landed at Calamari, where now stands Cartagena, and after a fierce engagement with the natives, continued his march southwards to the Rio Sinu valley, whence he brought back immense quantities of gold objects plundered from the local tribes.

Numerous other expeditions under Pedro, his brother Alonzo, and his lieutenant, Francisco Cesar, were made up all the affluents of the Rio Sinu, as well as to the districts forming the divide between that river, the Cauca, and the west bank of the Magdalena. The station of San Sebastian, founded by Hojeda on the Gulf of Uraba, near the mouths of the Atrato, was also rebuilt, and from this place Pedro de Heredia set out to discover a land of gold which the Indians called Dabeibe, and which is perhaps the district where is situated the present village of Dabeiba. After losing many of his followers, he had to retrace his steps; but Cesar was more fortunate, penetrating much farther inland, and, after a toilsome nine months' march through the forests, at last reaching the Eldorado, situated in the present state of Antioquia, near the great western bend of the Rio Cauca. Laden with the precious metal, he retreated in all haste, returning in a forced march of seventeen days to avoid pursuit by the formidable Choco Indians, whom he had defeated with great difficulty in a first engagement.

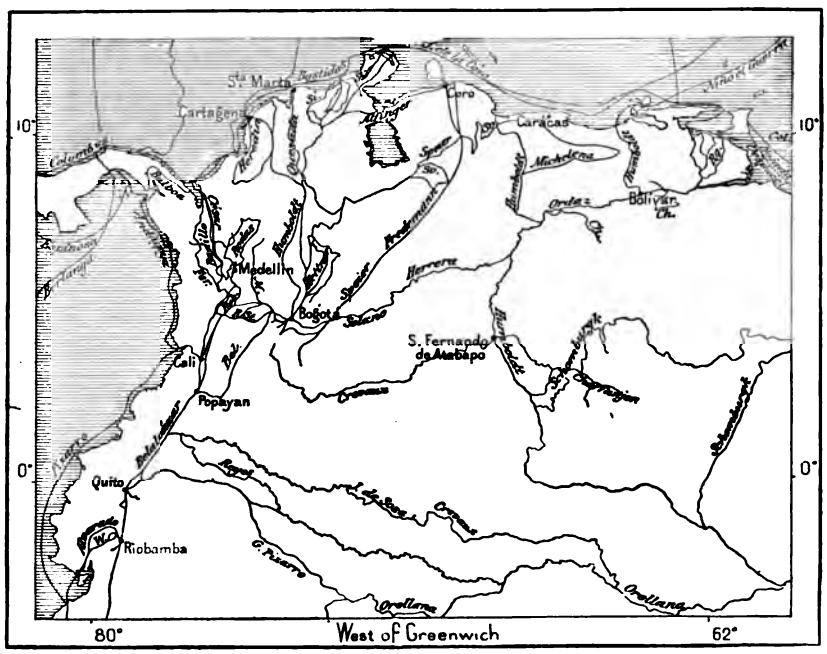
Meanwhile the great discovery had been made of the Cundinamarca plateau, inhabited by the civilised Muysca nation. The German, Georg von Speier, governor of Coro, had started from that place in 1534, and after penetrating into the llanos through the pass at the eastern extremity of the Sierra de Merida, had successively crossed the Orinoco affluents where they escape from the mountains to the plains. Beyond the Rio Upia, at the very foot of the Muysca plateau, he had continued his march southwards to and beyond the Ari-Ari in the Guaviare basin, returning to Coro after five years of hardships and sanguinary conflicts with the natives, in which he had lost four-fifths of his followers.

Speier might perhaps have fared better had his lieutenant, Fredemann, obeyed orders by coming to his assistance *en route*. Instead of doing so, the desire to secure the glory of the discovery for himself induced him to advance alone by a different track. Leaving the plains, he scaled the escarpments from the west, and thus reached the coveted goal, the rich land of the Muyscas, with its cities, temples, gems, and precious metals. But Fredemann had himself been forestalled, and on his arrival he found the plateau already in possession of other Europeans, who had come from quite an opposite quarter.

Belalcazar, properly Benalcazar, Pizarro's lieutenant in Quito, aspiring to extend his conquests in the direction of the north, and acting on the information

Fig. 50.—Chief Exploring Expeditions in Venezuela and Colombia.

Scale 1 : 24,000,000.



Si. = Simons.
Sv. = Sievers.
Bel. = Belalcazar.
Fer. = Fernandes.

Rob. = Robledo.
M. = Maldonado.
R.-St. = Reiss and Stübel.
W. = Whymper.

Col. = Columbus.
P. = Pinzon.
Rg. = Raleigh.
Ch. = Chaffanjon.

620 Miles.

received from the Peruvians of Quito, had sent forward a certain Juan de Ampudia, a ferocious adventurer, described in the quaint language of the chronicler as "causing the same effects as lightning and quicksilver. Like the latter he attracted all the precious metals that he found in the houses; like the former he burnt and reduced to ashes the houses themselves as well as the cultivated lands." Forcing his way by fire and sword to the banks of the Cauca, he here founded a city early in 1536 to which he gave his own name. But the rising colony was soon after removed by Belalcazar to the spot now occupied by Cali, political and commercial centre of the district. Returning to the south, Belalcazar

transformed the Indian city of Popayan to a centre of Spanish rule, explored the sources of the Cauca, overran the upper valley of the Magdalena, and at last ascended the slopes of the plateau on which stands Bogota.

A third conqueror had already come from the north when these rivals arrived from the south and west. Gonzalo Jimenez de Quesada had first to cross the difficult marshy tracts about the confluence of the Cesar with the Magdalena, where he lost his flotilla. Then he scaled the advanced slopes and, after forcing the gorges and passes, at last secured a firm footing on the plateau, where was soon founded the future capital, Santa Fé de Bogota. Quesada was now informed of the near approach of the two other bands, under Belalcazar and Fredemann; all three are said to have comprised exactly the same number of men—160 warriors, a priest and a monk. But all differed in their equipment, those fresh from the plunder of Peru being arrayed in silks and plumes, and those from Santa Marta wearing cotton fabrics woven by the Indians, while the Venezuelans coming from the llanos were clothed in the skins of wild beasts.

The three camps established at three corners of the plain threatened to come to blows, and after exterminating the Indians it was feared that they might end by slaughtering each other. But peace was preserved, Fredemann accepting a sum down in lieu of his pretended claims, while Belalcazar came to friendly terms with Quesada regarding the frontiers of their respective domains. As governor of the newly acquired territory, Quesada gave it the name of New Grenada, in honour of his native land.

By thus seizing the central region, which the surrounding populations had been accustomed to regard as a holy land, to respect and fear as the centre of civilisation and power, the Spaniards henceforth enjoyed the prestige of victory, together with the advantage of an impregnable strategic position. It was now an easy task to continue the work of exploration and to connect the various itineraries of the conquerors. The Spanish captains withdrew peacefully to their several domains, while the native chiefs brought the tribute of their villages, being at the same time compelled to purchase the salt of which the plateau enjoyed a monopoly.

Towns sprang up along the main routes, on the banks of the rivers, and near the mining districts. The exploration of the lower Cauca valley, and of the territory of Antioquia by Badillo and Robledo completed the survey of the upper fluvial basin already made by Belalcazar and his lieutenants. Then followed the navigator Andagoya, who, landing south of the Rio San Juan and ascending the little river Dagua, crossed the coast range down to Cali. Thus was discovered the great trade route of west Colombia, which is still followed. There remained only the secondary routes and less important districts, many of which, guarded by dense forests and fever-stricken marshes, are even now known only in their more salient features.

Of the numerous expeditions to the llanos which followed those of Speier and Fredemann all traces were lost in these vast and monotonous solitudes, effaced like "the way of the ship on the sea." No record has been preserved of the itineraries followed by Jimenez de Quesada in 1569, by Antonio Berrio in 1591,

and during the seventeenth century by Samuel Fritz, and so many other Jesuit and Franciscan missionaries, who visited all the tribes, ascended all the streams, and crossed all the portages of the Colombian plains.

During the two and a half centuries of Spanish rule the work of exploration was reserved for official surveyors, the results of whose labours were jealously guarded in the Government archives. Some of the documents, connected not only with the quest for gold, precious stones, or slaves, but even with scientific research, have not yet seen the light. At the close of the last century the naturalist José de Caldas, later executed as a rebel by the Spaniards, traversed every part of the country to study its soil and inhabitants.

Thus was begun the scientific work continued with such brilliant results by Humboldt, Boussingault, and many other explorers, foreign and native, down to the present time. Of the preliminary work preparatory to a general description of Colombia, the largest share falls to the credit of Agostino Codazzi, the same geographer to whom we are indebted for what still remains the best map of Venezuela. His map of Colombia, constructed on the scale of 1 : 1,350,000, from his own surveys taken in the years 1849-55, is also the most trustworthy document of the kind, and will continue to be chiefly consulted pending the construction of a chart on a more ample scale.* Such a work will soon be possible, for the engineers have already prepared sectional maps on scales ranging from the ten to the fifty thousandth, while millions of acres of unoccupied lands have been surveyed with a view to Government concessions and sales. The geographer Vergara y Velasco has already consulted all these topographical documents in the preparation of his great work on Colombia, where over two thousand positions had been astronomically determined before the year 1893.

Colombia presents exceptional advantages to colonists of every race. Like Mexico it offers, from sea-level to the mountain summits, the regular succession of all climates—heat, moderate temperature, cold, combined according to the slopes and aspects with varying degrees of dryness or moisture. But in Mexico the transitions are abrupt, and the temperate zone is represented only by comparatively narrow belts, whereas in the more highly favoured Colombia the healthy plateaux and foothills project far beyond the central alpine mass. Thus the regions enjoying a climate of average temperature similar to that of West Europe occupy a vast space large enough to support tens of millions of inhabitants. With the exception of the Santa Marta group, the Colombian ranges ramify like the ribs of a fan towards the north and north-east, and are so disposed as to present

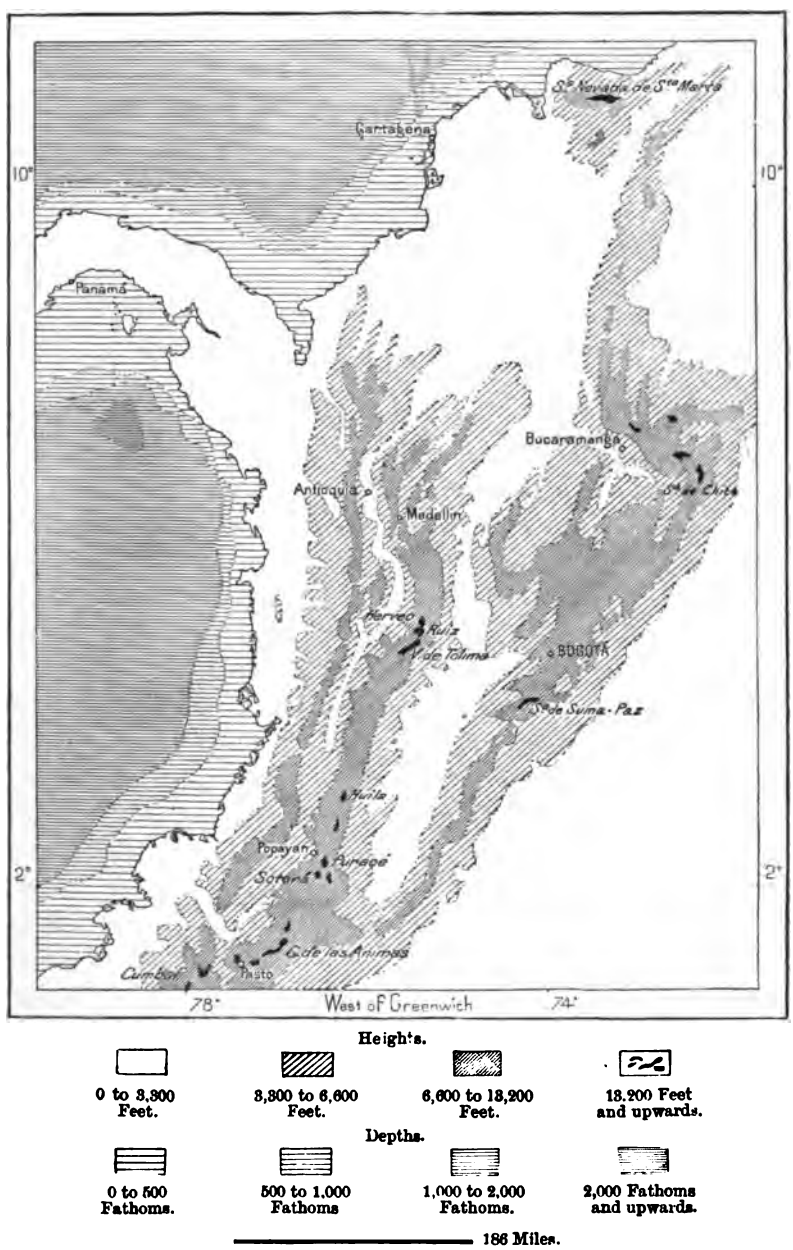
* Chief itineraries of Colombia and Venezuela in chronological order:—

Columbus . . .	1498	Speier	1534	Gonzalo Pizarro .	1540	Codazzi. . . .	1850
Nino, Guerra. .	1499	Berlanga . . .	1535	Orellana . . .	1540	Reiss and Stübel.	1870
Hojeda, Vespucci	1499	Cesar	1535	Berrio	1591	Steinheil . . .	1872
Bastidas . . .	1500	Ampudia . . .	1536	Juan de Sosa . .	1609	André	1875
Balboa	1513	Quesada . . .	1537	La Condamine .	1740	Crevaux . . .	1878
Andagoya . . .	1522	Fredemann . .	1537	Solano	1763	Schenck . . .	1880
Alfinger . . .	1530	Belalcazar . . .	1537	Humboldt . . .	1799	Hettner . . .	1883
Diego de Ordaz .	1531	Robledo . . .	1539	Boussingault . .	1831	Sievers	1884
Heredia . . .	1533	Badillo	1539	Schomburgk . .	1840	Chaffanjon . .	1885

cultivable lands at all altitudes and under all the latitudes and longitudes of the country.

Hence Colombia would be in a position to welcome multitudes of immigrants were accessible routes constructed from the coast to the uninhabited or sparsely

Fig. 51.—Zones of Altitude in Colombia.
Scale 1 : 9,500,000.



peopled regions of the temperate and cold zones. But the difficulties of the approaches to the uplands have hitherto kept settlers at a distance, while the hot, low-lying coastlands are unsuitable for white colonisation.

Relief of the Land.

In Colombia the highest group of mountains forms no part of the Andean system, but rises in complete isolation on the verge of the Atlantic as a triangular pyramid, with its most regular side facing seawards, its second turned westwards to the Rio Magdalena, and its third south-eastwards to the rivers Cesar and Rancheria.

The Sierra Nevada de Santa Marta, as it is called, covers a space of some 6,500 square miles, standing out like an insular mass high above the surrounding swamps and lowlands. At a former epoch it was really an island, and even still the highest pass over the rising ground separating it from the Cordilleras scarcely exceeds 920 feet. This rising ground, the Sierra Negra, is an alluvial plain, across which it would be easy to cut a canal between the two divergent streams, the Rio Cesar, flowing to the Magdalena, and the Rancheria, which sweeps round the east foot of the sierra to reach the Caribbean Sea. It seems evident that the plain formed the bed of the Magdalena before this river had shifted its course to a lower level farther west.

The Santa Marta and Goajira Uplands.

The snowy Sierra de Santa Marta, rising abruptly above the sea to a vertical height of over three miles, presents one of the grandest spectacles in the New World. Seen from the sea at sunrise, before its crests are wrapped in fleecy vapour or dense clouds, a full view is obtained of its precipitous flanks from the verdant woodlands at its base and the bluish crags following at mid-distance up to the crowning glory of its rose-tinged snowy peaks, standing out against the azure sky. Above the Rio Cesar valley the heights, although less abrupt, have a more forbidding aspect, owing to their arid, rugged slopes, unrefreshed by a breath of the moisture-charged trade winds. Beneath the vertical rays of the sun beating against the many-coloured bare rocks, the mountains seem all ablaze, as if a vast conflagration were rushing from the glaciers down to the plains.

There can be no doubt that the first Spanish conquerors had penetrated into the Sierra Nevada; the "frigid mountains" where so many of Alfinger's men perished of cold were the Citarma uplands inhabited by the formidable Tairona Indians. Later other Spanish expeditions invaded these heights in search of gold, and exterminated their inhabitants. In recent times the sierra has been visited by Fane, Karsten, Acosta, Sievers, and other explorers, who ascended the slopes to the neighbourhood of the snow-line. Simons came within a short distance of the great peak in 1875, when he crossed the Paramo de Chirugua at an altitude of 16,000 feet. During a second exploration he was arrested some 500 feet below the summit, variously estimated at from 17,350 to 19,000 feet high. At last J. de Brettes and Manuel Nuñez reached the highest point from the south, which is by far the most accessible slope, thanks to its less rugged character, the absence of forests, and the greater elevation of the snow-line.

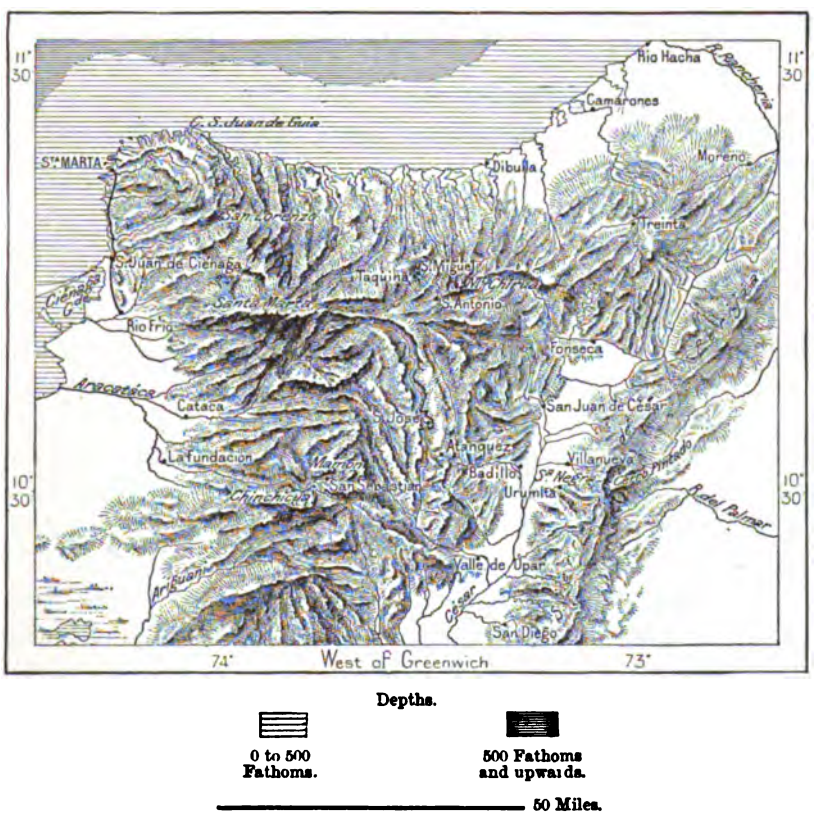
The central granitic group stands 28 miles from the sea in a straight line, which would give a general incline of not more than 3 in 10 yards; but the

SIERRA DE SANTA MARTA—EAST VIEW TAKEN AT PUNTA TAPIAS.

intervening terraces, precipices, and lateral ridges render all direct approach absolutely impossible. The formations are chiefly granites and metamorphic rocks, besides a few more recent lavas. Tradition even speaks of violent eruptions during the last century in the very heart of the mountains, and earthquakes are still of frequent occurrence.

Even on the north side, where they attain their greatest development, the permanent snows scarcely descend below the line of 13,000 feet. The glaciers are also few and of small size, though Acosta found clear traces of older glaciers

Fig. 52.—Sierra Nevada de Santa Marta.
Scale 1 : 2,000,000.



6,500 feet below their present limit. During the last glacial epoch they may even have descended to sea-level.

The heights of the Goajira peninsula, east and north-east of the Sierra Nevada, also constitute, if not an isolated mass, at least a group of detached hills, hillocks, and ridges, connected neither with the Santa Marta nor with the Andes system. They may be regarded as belonging, with the Paraguana peninsula, to the chain of islands here fringing the seaboard. The southern section of Goajira, contracted between an inlet of the Caribbean Sea and the bay of Ensenada de Calaboso, is a level plain diversified by a few isolated hills, such as the Teta Goajira (1,200 feet), a perfectly symmetrical trachytic cone visible from both inlets. Farther

east the chain of hills running from the Cabo de la Vela south-eastwards consists of steep crags, huge blocks strewn about or piled up in disorder, heights destitute of vegetation, a vast chaos of rocks and boulders, affording a safe retreat to the Goajira Indians. The system culminates with Mount Yuripiche (2,300 feet), standing near its southern extremity in the midst of other scarcely less elevated summits.

Parallel with this chain runs a second almost equally desolate ridge, disposed north-west and south-east between Bahia Honda and the Tucacas lagoon; here the highest crest is the Cerro Aceite, the Guajarepa of the natives (2,200 feet). This is followed by another parallel ridge, skirting the north-east coast, which takes the name of Macuira from its culminating peak, 2,600 feet high. All these little sierras consist of eruptive rocks disposed in a line with crevasses transverse to the main axis of the Andean Cordilleras.

The Eastern Cordillera.

The Andes properly so called begin at the neck of the Goajira peninsula with the forest-clad Montes de Oca, a range of low elevation, forming the political frontier between Venezuela and Colombia. But the heights soon attain an elevation of 6,500 feet and upwards in the Sierra de Perijaa, whose loftiest section usually takes the name of Sierra Negra ("Black Range"), doubtless from the gloomy forests clothing its limestone slopes, and contrasting above the Upar valley with the pink or whitish granites and snows of the Nevada.

The Cerro Pintado, loftiest summit of the system, presents the aspect of a citadel raised above the lower terraces. This superb eminence takes its name of the "Painted Mountain" from its white limestone ramparts, diversified with belts of woodlands and grassy gorges, flanked at the base with pink sandstone buttresses, and towering to a height of 9,850, or, according to Simons' estimate, 11,800 feet.

South of the Cerro Pintado the range, which is disposed in the direction of the meridian, falls gradually to a mean altitude of not more than 5,000 feet, with a culminating peak 8,200 feet high, in the Motilones district. The system continues to fall still lower in the region about the headwaters of the Colorado affluent of the Magdalena, and of the Rio del Oro, flowing through the Catatumbo to Lake Maracaibo; here the range is crossed by passes not more than 3,000 feet high, affording relatively easy communication between the two basins.

South of these passes the system maintains its southerly trend, though no longer presenting the aspect of a normal cordillera, but developing a number of irregular ridges spread over a very wide space. Here Mount Bobali attains an altitude of 6,740 feet; but the Simana crests nowhere exceed 5,000 feet, and the cordillera is crossed by a pass as low as 4,270 feet, near the latitude of Ocaña, on the Maracaibo slope.

Farther on the lateral ranges increase in height and length, the intervening valleys stand at a greater mean elevation, several peaks exceed 8,000 feet, while the Macho Rucio and the Cerro Pelado attain the respective heights of 9,850 and 11,000 feet. Secondary chains run from the central nucleus between Ocaña

and Bucaramanga, east and north-east towards the Venezuelan frontier, and here are seen such superb peaks as the Horqueta (10,768 feet), the Paramillo (10,450), and the Cerro Mina (11,000), rising above the grassy plateaux of the *mesas*, or "tables," which have themselves a mean altitude of nearly 10,000 feet.

Still farther south follow the crests which branch off to the Nevada de Merida, forming the divide between the Magdalena, Maracaibo, and Orinoco basins. Here the scenery is highly diversified with craggy heights, rich valleys penetrating far into the heart of the mountains, romantic glens suspended midway on the flanks of the precipitous slopes. Cachiri, culminating peak of these Colombian Alps (13,780 feet), constitutes the central knot of the system, while Tama (13,126) forms the frontier between the conterminous states. Westwards extends the Juan Rodriguez ridge, whose passes, 11,480 feet high, are amongst the most frequented in Colombia.

The whole of the Eastern Cordillera, that is, the Suma Paz range, rises above the upper line of arborescent vegetation. These *paramos*, or lofty crests, exposed to the cold winds and snowstorms, are much dreaded even by the highlanders, while travellers make immense detours to avoid them. Under the tropics the body is more sensitive to alternations of heat and cold than in temperate regions, and great risk is incurred by passing abruptly from the lower forest zone with a temperature often exceeding 86° Fahr. to the breezy plateaux, where the glass falls to 42° or 43° Fahr. Unless the circulation is kept up by great efforts the wayfarer is overcome by a feeling of numbness, frequently followed by death. Even domestic animals suffer, and birds in cages, enveloped in wadding, perish of cold in these bleak uplands.

Tama and its paramos are separated by the deep valley of the Rio Sarare, a main branch of the Apure, from the Sierra Nevada de Cocui, or de Chita, which rises some 60 miles to the east of the divide near Bucaramanga. The dominating crest of this lofty range is clothed with a snowy mantle about 2,000 feet in vertical height, above which rise five blackish domes, with an extreme altitude of 16,680 feet. The snowfields, some 10 miles in extent, are flanked by a vertical wall, interrupted only by a glacier, below which follows the Llano Redondo, a cirque of upland pasturage, inhabited throughout the year by a solitary herdsman at an altitude of 13,000 feet.

South of the Cocui range, the cordillera forming the divide between the Orinoco and Magdalena basins falls to a mean elevation of about 10,000 feet, with peaks rising at intervals to scarcely more than 3,000 feet higher. The eastern slopes, scored by torrents descending to the Orinoco, are far more precipitous than the opposite side, facing the western mountains and plateaux. But the crests everywhere follow in a series of long undulations, so that this section of the Cordilleras nowhere presents an Alpine aspect.

The eastern scarp of the Andean system ramifies westwards through a transverse ridge, which skirts the north side of the old lake of Bogota, and which is in reality a mere parting-line between the streams flowing to the opposite basins. On both sides the space limited westwards by the Rio Magdalena is a vast chaos

of heights, where it is impossible to recognise the primitive foldings of the plateau ranges, which have been carved into distinct groups by the running waters. The general trend, however, is parallel with that of the eastern scarp of the cordillera, and in the same direction, that is, either to the south-west or the north-east, have been discharged the large volumes of lacustrine waters which formerly filled the depressions of the plateau, and the outflow of which has modified the primitive relief of the land, excavating deep gorges, levelling mountain masses, heaping up enormous quantities of detritus at the foot of the escarpments, and depositing vast beds of alluvial matter brought down from the eroded uplands.

South of the highlands whence the Rios Upia, Chicamocha, and Funza diverge in various directions, the outer rim of the Eastern Cordilleras develops a series of long paramos, such as the Gacheneque, with its Pan de Azucar ("Sugar-loaf") 12,140 feet high, and the Carbonera (11,300). Immediately east of Bogota the Choachi and Chipaque paramos, ranging from 10,500 to 10,830 feet, form the divide between the Magdalena and the Orinoco, and this rampart is connected by a few bare crests with Nevado de Suma Paz ("Supreme Peace"), which culminates in a peak 14,146 feet high, and which gives its name to the whole system of the Eastern Cordilleras. Viewed from Bogota, these superb heights, aglow with the rays of the setting sun, seem a new Olympus, a happy abode of the gods dwelling in "supreme peace."

South-westwards the Suma Paz is flanked by the Alto de las Cazuelitas (12,800 feet), the Cumbre de las Oseras (12,470), the Ari-Ari (11,485), and a few lesser giants about the sources of the Guayabero, westernmost headstream of the Orinoco. Farther on begins the so-called Miraflores Chain, last and lowest section of the Cordilleras, whose culminating peak, Miraflores, scarcely exceeds 9,180 feet. Its eastern scarp trends south-westwards to the three peaks of La Fragua ("The Forge"), whose very name would seem to suggest an igneous origin, as they are figured on the old maps, although, according to Codazzi, the dominant peak consists of syenite. Here terminates the Eastern Cordillera, the erosion of the Amazonian affluents having left nothing but an elongated ridge, under 6,000 feet high, between the Forge and the Central Cordillera.

The Central Cordillera.

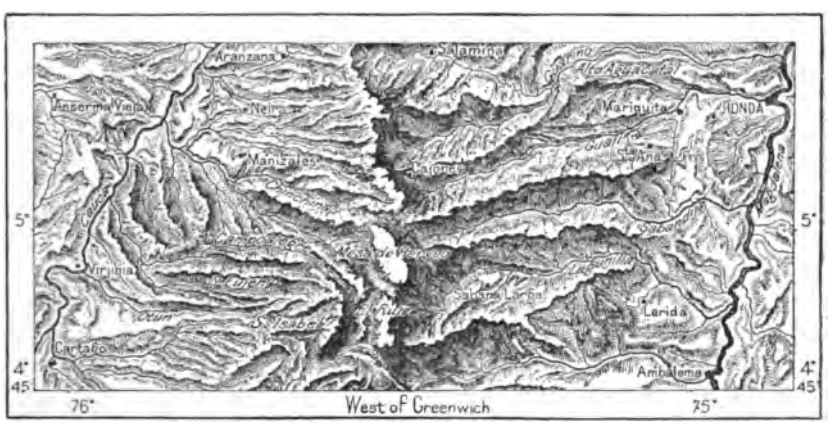
The central branch of the Colombian Andes is sharply limited by the course of the twin rivers, Magdalena and Cauca. It often takes the names of the Sierra de Quindio from the famous pass by which it is crossed about the middle of the system. This central section, possessing the loftiest summits and most Alpine character, should be regarded as the main range of the Andean highlands, of which the cordilleras of Suma Paz and of Choco are mere ramifications. But these superb heights, with their jagged crests standing out against the blue sky, are seldom visible from the terraced plateau of Bogota, except during the early morning hours. After nine o'clock fleecy vapours are seen rising in the upper valleys, which gradually become more dense and expansive, until the huge mass

of Ruiz, the truncated cone of Tolima, and all the intermediate peaks are wrapped in continuous fog

Rising in terraces in the direction of the south, the various branches of the Central Cordillera soon merge in the broad plateau of Antioquia, which is carved into secondary mesas by the Nechi and its affluents. The Cerro Grande, in a lateral ridge near the Magdalena, rises to a height of 5,350 feet, while the Central Cordillera is dominated under the same latitude by Mount Yarumal, whose twin peaks are respectively 7,470 and 7,230 feet high. In this region the uplands broaden out considerably, descending in comparatively gentle slopes down to the Magdalena. But westwards they fall abruptly, and beyond the deep bed of the Cauca again rise rapidly in the escarpments of the Western (Choco) Cordillera.

In the midst of this chaos of crests in the district of Antioquia the chief group is the Santa Rosa de los Osos ("Bear" Mountains), which in the San Jose

Fig. 53.—Mesa de Herveo and Ruiz Volcano.
Scale 1 : 1,850,000.



peak attains an altitude of 9,000 feet. The various branches converge south of Medellin and of the Rio Porce in the transverse crest of San Miguel, 9,025 feet high.

The Alto Pereira, eastern limit of this rampart, constitutes the corner-stone of a remarkable chain disposed in the direction of the south, and increasing in height in proportion as it loses in breadth. On a pedestal of crystalline rocks, flanked on both sides by cretaceous formations, rise lofty pyramids of eruptive matter, mountains piled up like "Pelion on Ossa." In this chain of volcanoes the first crater is the huge Mesa de Herveo, 18,340 feet high, flanked by another some 3,000 feet less elevated. Vast buttresses disposed in terrace formation fill up the whole space comprised between the Rios Magdalena and Cauca.

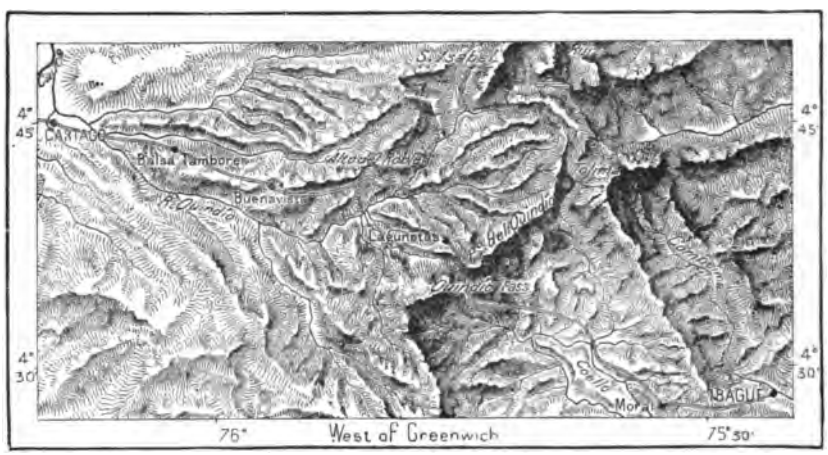
Northwards the Mesa de Herveo is limited by a flooded depression, whence two streams flow in opposite directions to the two parallel rivers. Southwards it is followed by the snowy Ruiz (17,390 feet) and Santa Isabel (16,760). In 1839

Degenhardt noticed columns of smoke rising above Ruiz, which seems to be not yet quite extinct. Hot springs at a temperature of 148° Fahr. bubble up near the summit on the west side, liberating 36 cubic feet of sulphuric and hydrochloric acid per hour.

Tolima, giant of the Colombian Andes, raises its andesite cone to a height of 18,400 feet, some 4,000 feet above its slate and mica-schist pedestal. Numerous parasitic volcanoes bristle on the slopes of the cone, which stands to the east a little beyond the main axis of the system. Tolima is one of the volcanoes lying farthest from the sea that are not yet quite extinct. In 1595 the snow covering its crater and the neighbouring cones was melted so rapidly that two torrents, suddenly transformed to rivers and charged with vast quantities of debris, caused destructive inundations below Ibagué. The waters were so impregnated with acids that all the fish perished. In 1826, and again

Fig. 54.—Quindio Pass.

Scale 1 : 850,000.



18 Miles.

in 1829, Tolima ejected columns of vapour, while solfataras have sprung up on the neighbouring paramos, and on the Quindio Pass south-west of the volcano. This pass, the most frequented of all in the volcanic sierra, connects the Cauca and Magdalena basins at an elevation of 11,440 feet. Till recently it was of extremely difficult ascent, but now the approaches on both slopes have been greatly improved by a pathway developing regular meanderings at a uniform gradient.

South of Tolima the cordillera falls considerably as far as the peak of Santa Catalina, in which it again rises to 16,170 feet, that is, the lower limit of perennial snows. Then follows the imposing mass of the three-crested Huila (18,000 feet), which still shows some life in its sulphurous vapours escaping from a few fissures and melting the surrounding snows. South of Huila, the Guanacas Pass, rather more elevated than that of Quindio, connects the two upper Magdalena and Cauca valleys. This broad gap was followed by Belalcazar on his first expedition of conquest in New Grenada.

Towards the south of Colombia the volcanic cones of the Central Cordillera become more numerous and more active. In 1849 Puracé, at that time terminating in a regular dome, suddenly exploded, ejecting ashes and melting its snows, which rushed down in a deluge of slush, sweeping away the neighbouring villages

Fig. 55.—Colombia Mountains.

Scale 1 : 485,000.

12 Miles.

and even threatening the town of Popayan 17 miles off. Since then the summit presents the aspect of a truncated cone, which may be ascended on horseback to a height of 14,440 feet, or within about 1,640 feet of the top, though the estimates of its present height vary considerably.

In 1869 another eruption filled the bed of the Cauca with mud and pumice, and completely obstructed the stream for some time. A rivulet flowing from the slopes of a parasitic cone tumbles over a superb cascade 260 feet high. This is the famous Pasambio, or "Vinegar River," which, according to Boussingault, annually liberates 17,000 tons of sulphuric acid, and 15,000 of hydrochloric acid.

Puracé forms the north-west termination of the snowy five-peaked Coconucos chain, south of which extend the Buey plateau and a large group of heights and paramos collectively known as the "Mass of Colombia." Here is the true hydrographic centre of the country, where rise the four great rivers Patia, Cauca, Magdalena, and Caqueta, this last a main headstream of the Amazons. The ridge separating the upper Patia and upper Cauca waters is surmounted at its northern extremity by the extinct Sotara volcano (14,500 feet), which presents an imposing aspect, thanks to its isolation and to its bare gloomy rocks, contrasting with the surrounding forest-clad heights.

South of the Colombia group the three main Cordilleras converge in the Pasto "knot," near which rise the three volcanoes of Bordoncillo (Patascoi), and Campanero (12,470 feet), at the foot of which lies the lacustrine Cocha basin, draining through the Putumayo to the Amazons, and lastly the Pasto (14,000 feet), which gives its name to the whole group, and which is itself named from its extensive pasturages. From the vast crater of the Pasto flows a stream charged with acids, like the Vinegar River, but three times more copious. During the frequent eruptions of this volcano fragments of incandescent rocks are often hurled to a great height.

South of Pasto towards the Ecuador frontier follow other volcanoes, such as the Azufral (13,360 feet), the Cumbal (15,720), and the Chiles (15,680), which already stand in the main axis of the Choco or Western Cordillera, the third great Andean chain of Colombia. The Azufral crater is at present flooded by a deep emerald-green lake, while sulphurous vapours in a state of combustion flit over the snowy crest of Cumbal.

The Western Cordillera.

Like the other Cordilleras, the western range consists of a central crystalline backbone underlying cretaceous formations; but no igneous cones occur anywhere in the section extending from the plains of the Atlantic coast to the banks of the Rio Patia. Excluding the low Maria chain between the lower Magdalena and the sea, the Choco system proper begins with the heights enclosing the Rio Sinu basin. Eastwards are grouped the Murrucucu Mountains, which are prolonged south-westwards by the San Jeronimo chain, while on the west rise the Quinamari plateaux, whence a range of heights runs north-west to the Aguila headland at the eastern entrance of the Gulf of Uraba. Here the Chigurrado peak attains a height of over 6,500 feet.

The various ramifying branches at the extremity of the cordillera converge in the Paramillo (11,120 feet), between the Cauca and the upper Rio Leon valley.

Westwards the system is continued due south with several lofty crests, such as the Paramo de Frontino Citara (11,160 feet), and the San José (9,860).

Eastwards the ranges approach the Cauca valley so closely that the river seems to flow in a trench of prodigious size. On the west side rises the Cerro Torra, an isolated mass of schistose rocks, containing auriferous quartz veins, found to be 12,600 feet high by Robert Blake White, who scaled it in 1878.

South of the Rio Caramanta the cordillera, running parallel with the coast, trends slightly westwards, culminating in the Tatama peak (9,850 feet). The scarcely less elevated Munchique, dominating the west side of the upper Cauca valley, projects a spur to the Sotara volcano, south of the Central Cordillera. Beyond this junction the Western Cordillera is abruptly interrupted by the Minama gorge (1,676 feet), which is traversed by the tranquil current of the Patia. Farther on the system merges in the chaos of mountains often called the Tuquerres "plateau," from one of its crests, 13,360 feet high. Yet the Tuquerres is itself overtopped by other summits, such as the Gualcala (13,780), and the above-mentioned Chiles and Cumbal volcanoes.

Oscillations of the Seaboard—Islands.

Various phenomena have been observed along the Colombian seaboard indicating frequent changes of level. In several places, and especially east of the Sierra Nevada de Santa Marta, the old beach, covered with shells similar to those now inhabiting the neighbouring seas, stands high above the present shore. Elsewhere sudden changes have been observed, apparently due to volcanic action, but which may be explained by the spontaneous combustion of hydrogen gas escaping from certain "mud volcanoes." The Galera Zamba, one of these safety-valves, 80 feet high, stands on the coast near Cartagena, at the neck of a long tongue of land which projects far seawards, and which is alternately an island and a peninsula. About 1840 an eruption of the cone was followed by the creation of a channel, 25 to 30 feet deep, between the island and the mainland. But in 1848, after another explosion, accompanied by flames visible over 90 miles off, the channel was again obliterated for a few weeks, when a great part of the island itself disappeared. The combustion of vapour, attended by the discharge of mud and earth, has been attributed to the electric tension of the carburetted hydrogen gases, which usually escape from the ground with the saline waters percolating from the neighbouring lagoons.

Most of the islets fringing the Colombian seaboard, such as Zamba and the Cartagena cluster, the Panama archipelago, Tumaco, and the groups at the mouths of the Rios Patia and Mira, are mere geographical dependencies of the mainland. The San Andres and Vieja Providencia groups in the north belong to Central America, and are only politically included in Colombia, like the two oceanic islands of Malpelo and Cocos, at some distance from the Pacific coast. Malpelo, 310 miles west of Buenaventura Bay, is a mere rock, with nearly vertical walls rising 850 feet above a submarine bed, separated from the continent by depths of 1,400 fathoms. Cocos, so named from its coconut-groves,

belongs to another submarine bank, apparently connected with the Galapagos Archipelago, and separated from Cocos by abysses of 1,700 fathoms.

Rivers of Colombia—The Magdalena.

The Magdalena, main fluvial artery of Colombia, and fourth river of South America in volume, belongs entirely to the Andean system. Its two chief branches rise and are developed between two cordilleras, and all its affluents come from the region of the Andes. Its main trend is also in the direction from south to north, that is, in a line with the longitudinal axis of the Cordilleras.

The farthest headstream has its source in the Colombia mass between the two loftiest groups of volcanoes—Puracé in the north, and Las Animas in the south. After collecting various torrents from the lacustrine Paramo del Buey plateau, the Magdalena plunges suddenly some 300 feet through a series of rapids down to the confluence of the Suaza, by which its volume is nearly doubled. Here the mainstream is already 8 or 10 feet deep, with some navigable reaches, although still 6,230 feet above sea-level. Regular steam navigation may be said to begin at Neiva, although steamers usually stop at the confluence of the Saldaña, which descends from the Central Cordillera, and which increases by one-third the normal discharge.

Above Girardot, where it is deflected west by north by the escarpments of the Bogota plateau, the Magdalena is joined by the Fusagasuga (Suma Paz) and the Bogota, both remarkable for the wild grandeur of their old lacustrine valleys. After traversing an elevated terrace, of which the capital occupies one extremity, the Bogota, here better known as the Funza, flows sluggishly in a slightly inclined bed, overflowing its banks, and flooding the riverine marshes during the rainy season. But on reaching the edge of the plateau a little below Bogota, it is precipitated 475 feet over the Tequendama Falls into a rocky chasm, clothed with a rich tropical vegetation, and usually shrouded in mist. A marvellous spectacle is presented at this point, where 4,250 cubic feet of water per second are discharged in a single column three times higher than Niagara. Below the falls the stream rushes wildly over a succession of rapids to its junction with the Magdalena, descending in this short space of about 60 miles a total incline of 5,830 feet.

Immediately below the confluence the Magdalena becomes entangled in a rocky gorge 430 feet wide, now crossed by an iron bridge. Between Girardot and Honda the fluvial level is lowered, with a tolerably uniform incline, from 920 to 650 feet. But at Pescaderias, near Honda, the stream enters a series of dangerous falls and rapids, practically interrupting the navigation for a distance of 15 miles. Hence a railway has been constructed on the west (left) bank to facilitate the communications between the upper and middle Magdalena, the total vertical incline at these Honda gorges being 116 feet.

Farther on the stream still maintains a somewhat torrential aspect as far as the junction of the Rio Nare, contracting at the Carare Narrows to a channel 410 feet wide, hemmed in by rocky walls on both sides. During the floods, when

there is a discharge of 180,000 cubic feet per second, the river has a depth of no less than 100 feet at these narrows.

Beyond the Nare gorge the character of the river is completely changed. It

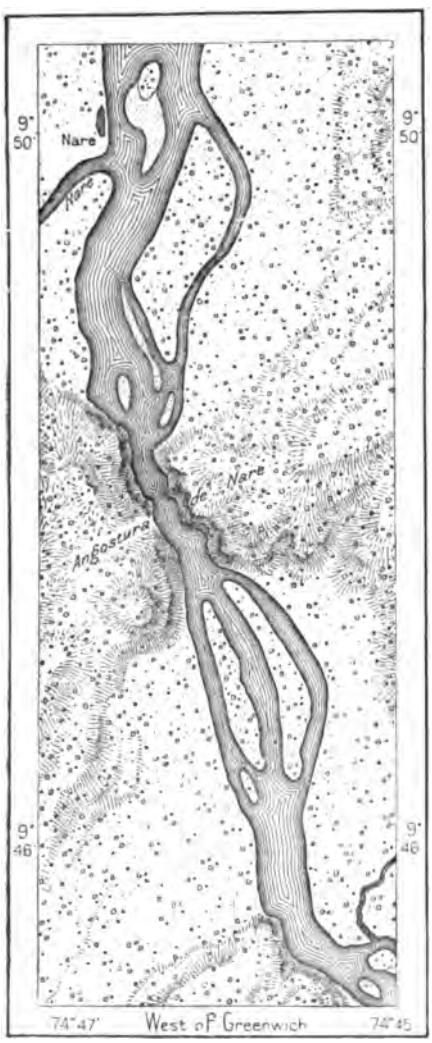
Fig. 56.—Tequendama Falls; View taken at the First Terrace.

broadens out and ramifies round wooded islands, and overflows right and left into the riverine lagoons, which represent old branches of the mainstream. With every inundation the fluvial bed and lateral channels are modified; steamers

are often arrested or delayed; snags drift together and form obstructions, as on the Mississippi or its Red River affluent, or else become embedded in the mud, a constant danger to passing craft. In this section, which in many places expands to a width of over a mile, the chief affluents are the Carare, the Opon, and the copious Sogamoso.

Next to the Cauca the Sogamoso is the largest tributary, and derives special importance from the region which it traverses, one of the most densely peopled, industrious, and historically interesting in Colombia. It is formed by the junction of two main branches, the Chicamocha, which has the longest course, and the Saravita, which is the most copious. On the banks of the Chicamocha, which is regarded as the mainstream, is situated the city of Sogamoso, which gives its name to the whole system.

Fig. 57.—The Nare Gorge.
Scale 1 : 75,000.



Rising in an upland valley of the Eastern Cordillera, not far from the escarpments facing the llanos, the Chicamocha flows parallel with this outer Andean range as far as the lofty Cocui heights. Here it trends round to the north-west, forcing its way through the successive Andean chains in stupendous gorges hundreds of yards deep. In the Sube defile the bed of the river is contracted to 70 feet in width, with a volume of 6,400 cubic feet per second, rushing between rocky walls 2,730 feet high.

The Saravita or Suarez, rising midway between the Eastern Cordillera and the Magdalena, has a still more savage aspect than the Chicamocha, for it has to descend from the same altitude in a course less than half as long. After traversing the marshy plateaux and the vast Lake of Fuquene, which looks like a permanent inundation, the Saravita makes a sudden plunge of 70 feet, and then in the space of 3 miles descends 2,300 feet in a narrow gorge, where it disappears altogether for a distance of over 200 yards. Other gorges, cascades, and rapids follow in quick succession, while every lateral torrent has its narrows, its cañons, cataracts, chasms, and underground channels.

Below the junction of the two main branches the Sogamoso, here flowing

1,900 yards below the neighbouring uplands, still preserves its wild character, rushing between its narrow rocky walls with a velocity that arrests all navigation except for a short distance of some 30 miles on its lower course.

The Lake of Fuquene, whence the Saravita escapes, was certainly much larger at the period of the Conquest than at present. Piedrahita, who visited it in the middle of the seventeenth century, gives it 10 by 3 leagues, whereas Roulin's recent careful measurements show only 4½ by 3 miles for the whole basin. Its level, now 8,400 feet, was formerly much higher, comprising the lacustrine basin of Ubate and all the intermediate plains, as is attested by the water-marks still visible along the flanks of the encircling hills. But the waters gradually subsided, revealing islands, peninsulas, isthmuses, and extensive plains, so that in 1780 the inland sea had already been decomposed into two completely distinct basins. The village of Fuquene, originally built on its banks, is now 3 miles distant. Boussingault attributes the subsidence to the destruction of the surrounding oak and wax myrtle (*myrica*) forests, used up for building purposes, and especially as fuel for the Nemocon and Tausa salines. At present the lake has only an average depth of from 20 to 26 feet, although much used for the traffic in local produce.

Although much smaller than the Sogamoso, the Lebrija is also a copious affluent, rising in the eastern mountains and joining the Magdalena on the plains, not directly, but through the wide-branching and ever-shifting inland delta which is here developed. Towards the middle of this delta the main branch is now deflected to the north-west, but it formerly continued its northerly course to the sea east of the Sierra Nevada de Santa Marta, through the valley now occupied by the Rio Rancheria. During the floods the Magdalena still sends its overflow northwards to the old bed, and thus is formed the vast Zapatosa lagoon, varying with the seasons from 400 to 700 or 800 square miles in extent and from 20 to 25 feet deep.

Besides the periodical contributions of the Magdalena from the south, Zapatosa and the neighbouring basins receive the Rio Cesar, descending on the opposite side from the Sierra Nevada and the Sierra Negra. The Cesar, formerly Cesari, takes its name not, as might be supposed, from the Portuguese conqueror of the Antioquia plateau, but from an Indian word meaning "Smooth Waters."

Below its Zapatosa affluent the Magdalena again ramifies. Till recently the main branch trended north-west along the foot of the Sierra Nevada terraces; but in 1801 it had already reopened on the left the tortuous Loba channel, through which some of its waters flowed to the Cauca. After various shiftings between the two beds, the Loba at last became the main channel in 1868, since which time the more convenient eastern branch has been gradually silting up. In the dry season it is at present a narrow passage, scarcely 20 inches deep at the sills, and in some places merely stagnant water. The Loba branch, on the contrary, which receives the Cauca, and a little lower down the San Jorge on its left bank, now carries nearly all the united waters of the whole basin. The line of navigation has thus been changed, and while the towns on the east branch are decaying,

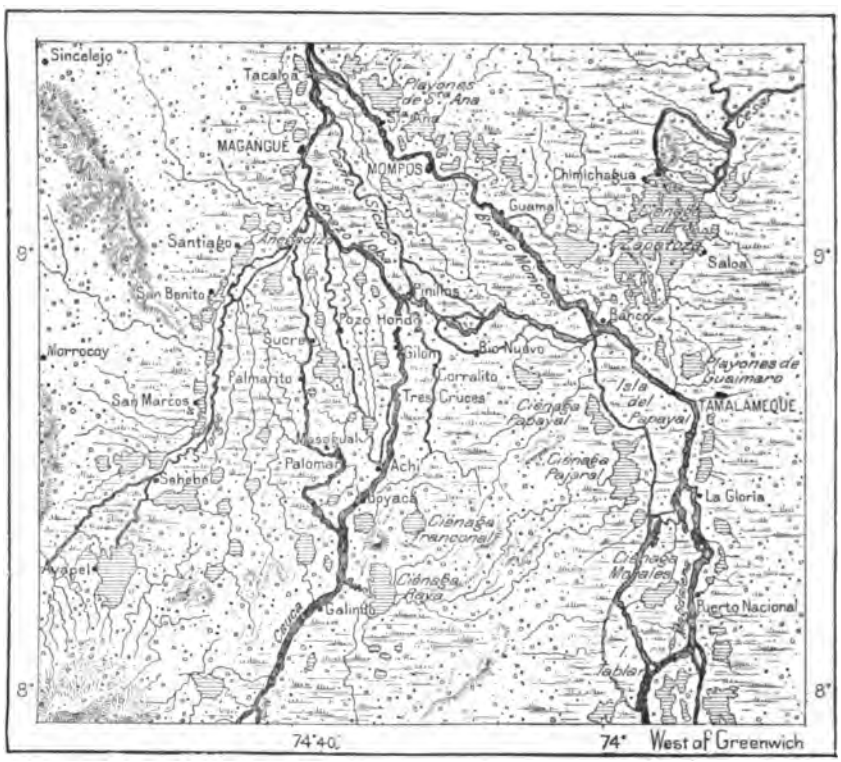
those on the Loba have become riverine ports, threatened, however, to be submerged by the rising waters.

The Cauca and Magdalena Delta.

The Cauca, the Rio de Santa Marta of the first settlers, rises in the same uplands as the Magdalena, and follows a parallel valley with corresponding stages on its course to the plains. Rushing in a rugged fissure between the Puracé and Sotara volcanoes, it descends a total vertical height of 8,200 feet in a course of 60 miles, thus reaching the bed of the old lake which stretched south and north

Fig. 58.—Inland Delta of the Magdalena.

Scale 1 : 1,900,000.



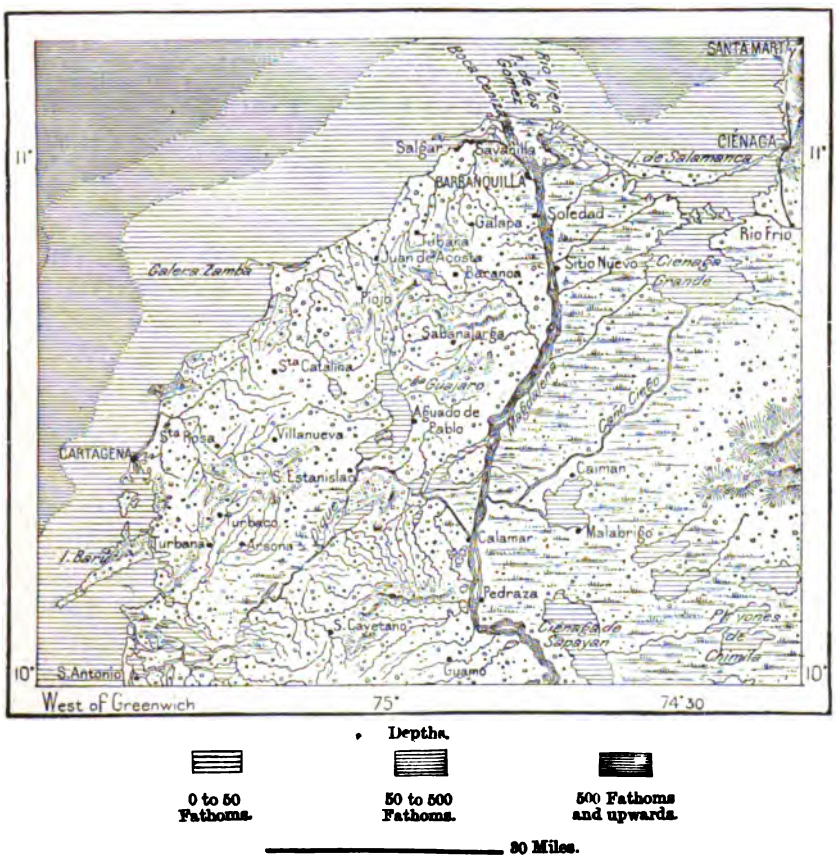
between the Western and Central Cordilleras. Here its tranquil stream is navigable for steamers, although these reaches possess little economic importance, being suspended, so to say, above the lower plains and separated from them by a long series of rapids and swirling waters.

Below the town of Cartago the Cauca glides with great rapidity down a steep incline, without, however, forming any falls, despite the misguiding expression, *Salto* de Virginia, applied to the incline. Here begins the unnavigable section which, in the space of 386 miles, has a total fall of 2,660 feet without a single cascade, but with many rapids, eddies, foaming waters, reefs, and gorges. At certain points the stream is narrowed to about 100 feet between sedimentary rocky

walls, across which bridges of trailing plants have been thrown, Indian fashion. One of these, on the route between Medellin and Antioquia, is no less than 750 feet long from bank to bank.

Beyond the last escarpments the Cauca is joined by the Nechi, a considerable affluent descending from the heart of the Central Cordillera, in nearly a straight line from south-west to north-east, thus forming, as it were, a chord to the arc described by the mainstream itself. The Nechi is formed by two branches, the smaller of which keeps the name of the mainstream, although flowing in a lateral

Fig. 59. – Mouths of the Magdalena.
Scale 1 : 1,600,000.



valley, while the longer and more copious, which retains the direction of the lower course, is known as the Porcé or Medellin. Both descend from the highlands abruptly to the plains through a series of terraces, cascades, and rapids, like those of the Sogamoso. The Guadalupe affluent of the Porcé plunges over a *salto* (fall) no less than 820 feet high.

At the Nechi confluence the Cauca, here 2,000 feet wide, winds through a level plain between low banks fringed with marshes. At Guamal, where it joins the Magdalena, it has a discharge of 77,800 cubic feet per second, and seems little inferior in volume to the mainstream. After the junction of the San Jorge, and

of various lateral channels, the united waters spread out beyond the horizon, over a region aptly named the *Anegadizo* ("Submerged").

The section of the Magdalena which extends from the Cauca confluence to the Dique de Calamar, that is, the first branch of its marine delta, has a total length of scarcely more than 60 miles. The *Dique* (canal) itself is a mere channel 200 or 300 feet wide, and not more than 8 inches deep in some places; and although it becomes a copious stream, it would soon be obstructed by the aquatic growths and lost in the surrounding swamps were the Dique not kept open by embankments and other artificial works.

To the right branch off the Caño San Antonio, the Caño Remolino and several other channels, which traverse the marshy tracts between the mainstream and the Cienaga inlet at the west foot of the Nevada de Santa Marta. But these shallow, sluggish creeks carry off very little water, so that the Magdalena proper retains nearly the whole of its volume as far as the triangular island of Los Gomez where the true delta is formed by its two ramifying branches.

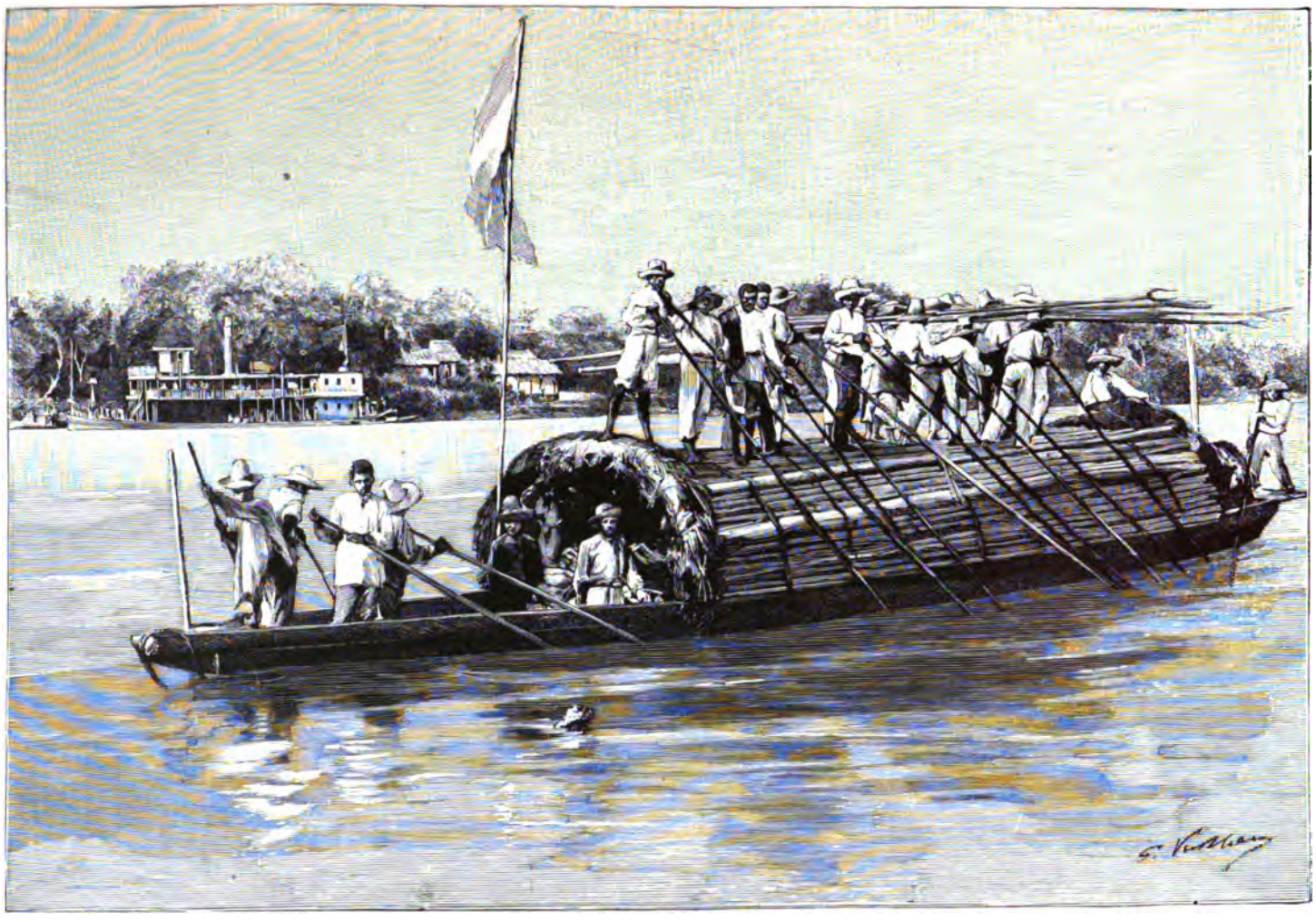
The Rio Viejo, or eastern branch, 600 or 800 yards broad, has a depth of not more than 5 feet, and is accessible only to boats. The Boca Ceniza, a western branch, first ascended by steamers in 1857, had a uniform depth of 23 feet in 1875. But it is frequently obstructed, and accidents often occur from the lack of buoys, and especially of regular and continuous surveys. The tides, rising only from 10 to 20 inches, add little to the depth of water at the dangerous bar, which is consequently avoided by large vessels. Otherwise they could easily ascend some 200 miles to Tacaloa, at the Cauca confluence, this lower reach being nowhere less than 26 feet deep.

Savanilla, the maritime port, stands not at the entrance, but on the west coast, and is connected by rail with Barranquilla, the riverine port on the left bank near the head of the delta. This place, like so many others, has been left a little to the west by the main branch, which is gradually being displaced eastwards. Between Barranquilla and the Honda rapids the voyage by steamer averages 5 or 6 days down, and from 10 to 15 up stream. Formerly the *bongos* and *champanes* (barges) often took two or three months to make the ascent.*

Between the Magdalena delta and the Gulf of Uraba the Sinu is the only river reaching the coast. It rises in the Paramillo uplands, and ramifies, like the Magdalena, into a labyrinth of shifting branches in an old lacustrine district, now half filled up by alluvial matter. Beyond this inland delta all the waters are again collected in a single channel, which discharges about 11,500 cubic feet per second into the Morosquillo Gulf. The Sinu is accessible the greater part of the year to steamers for a distance of 110 miles, and to boats 60 miles farther, though the navigation is much obstructed by the shoals of the gulf, the dangerous

* Statistics of the Rio Magdalena:—

Area of the basin according to Vergara y Velasco	100,000 square miles.
Length of course	1,060 miles.
Length of navigable waters	750 miles.
Length of ramifications	1,750 miles.
Mean discharge	264,000 cubic feet per second.



BONGO ON THE RIO MAGDALENA.

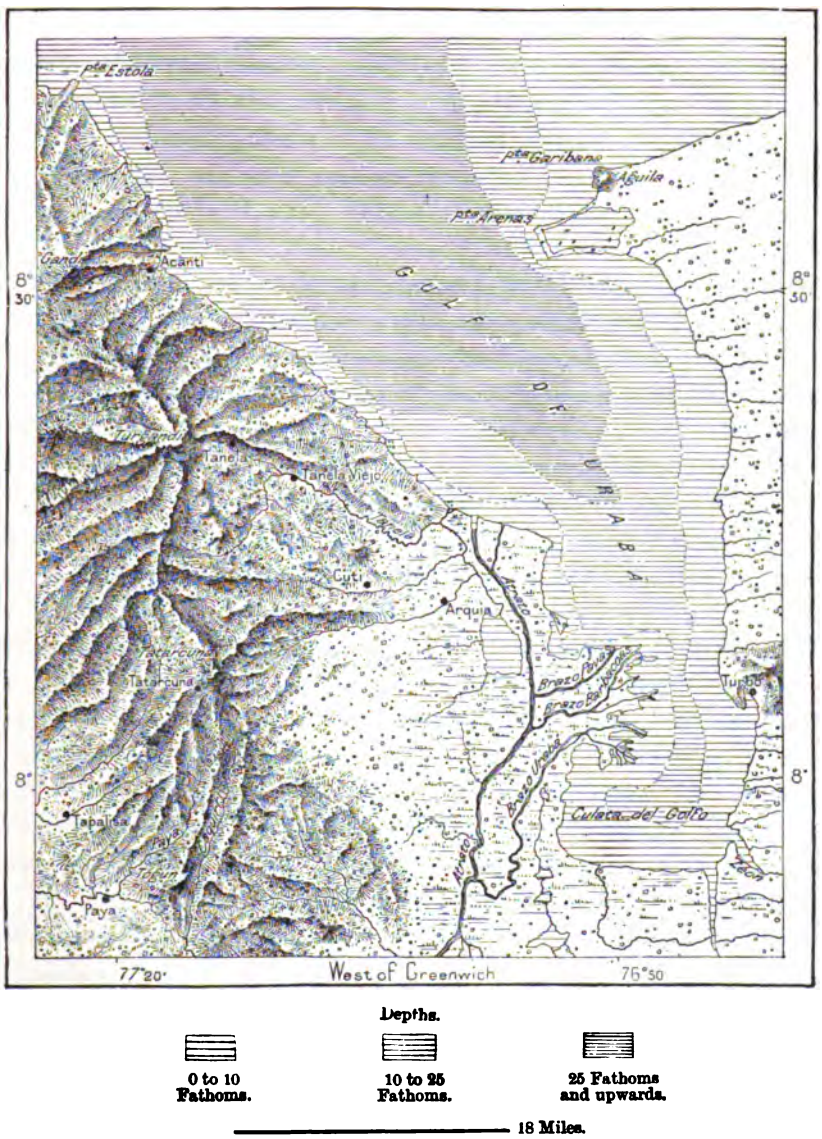
bar, and rapids higher up. Hence the stream is chiefly used for floating down lumber.*

The Atrato.

The Atrato (Darien, Choco), which forms the natural limit of South America towards its north-west extremity, is almost less a river than a moving morass.

Fig. 60.—Mouths of the Atrato.

Scale 1 : 825,000.



Depths.

0 to 10 Fathoms. | 10 to 25 Fathoms. | 25 Fathoms and upwards.

18 Miles.

Thanks to the heavy rainfall of its basin, it discharges a larger volume in proportion to its extent than any other known watercourse. Rising beyond the Andes

* Length of the Sinu according to Vergara y Velasco, 286 miles; extent of the fluvial basin, 6,500 square miles. Mean discharge, 11,500 cubic feet per second; at high water, 32,000; at low water, 7,000.

on the low divide separating its sources from those of the San Juan, the Atrato loses the aspect of a mountain torrent as soon as it trends round from west to north in a line with the longitudinal axis of its valley. On entering this depression, which was an old marine inlet, it is already navigable for boats, and during the floods even for steamers.

Swollen by hundreds of affluents both from the Western Cordillera and from the coast range, and farther on by the majestic Rio Sucio from the Paramillo uplands, the Atrato winds in long meanderings, from 400 to 700 yards wide, through the chain of riverine marshes and circular lagoons periodically flooded by its inundations. Its rapid currents, entirely free from the aquatic growths covering the surface of several of its tributaries, develop a vast network of channels separated by sedge and reeds tall enough to mask their winding banks. A few isolated eminences rise in the midst of the marshy waters along the adjacent plains, and the traveller wonders whether he is sailing on a river or on some shallow inland sea.

In its lower course the Atrato for some distance skirts the west side of the Gulf of Uraba, and then, turning east, falls into the sea through a many-branching delta, whose alluvial deposits extend considerably beyond the normal coastline. Without reckoning the minor channels, as many as fifteen branches are developed in this alluvial delta. But the position, the size, and even the number of the mouths are yearly modified according to the volume of water and the quantity of mud and vegetable matter discharged by the river.

The peninsular deltaic formation projecting from the west coast is steadily advancing eastwards, and must eventually close the *Culata* (Sack) of the Gulf of Uraba, leaving only a narrow channel for the streams reaching the coast at this point. Thus the marine inlet is being gradually transformed to a lake, and when visited by the explorer Fidalgo in 1793 the Culata was already fringed with mangroves, and partly covered with *gamalotales*, that is, floating meadows. But the channel was still from 180 to 215 feet deep, whereas, according to the most recent charts, it has now shoaled to from 70 to 160 feet. The Rio Leon (Cuacuba), which discharges into the head of the Sack, may be regarded, like the Rio Suriquilla, as belonging to the basin of the Atrato, which is also joined by several other lateral streams about the delta district.

Of the numerous branches two only are accessible to sloops and eight to boats. On the bars the depth averages no more than about 6 feet, whereas within these obstructions it is everywhere sufficient for large vessels. In some places the plummet reveals as much as 60 or 70 feet, and the only dangers on the mainstream and its navigable affluents are the abrupt windings and the barriers formed by snags, at some points right across the channel.

The Atrato has often been spoken of as one of the future highways of navigation between the Atlantic and Pacific Oceans. In 1793 Fidalgo already mentions the *arrastradero* (portage) of San Pablo, where a cutting "a little over a mile long" would suffice to connect the two navigable Rios Atrato and San Juan. Later Humboldt urged the facility with which this low divide might

be pierced at the Raspadura gorge, and towards the middle of the present century Trautwine, Porter, Michler, Selfridge, and other explorers suggested the tunnelling and cutting of the coast range between the Pacific and the Truando or the Napipi affluent of the Atrato. But all these schemes were abandoned after the adoption of the Panama route; nor have they been revived since the failure of that disastrous undertaking.

The Atrato itself, which might have such paramount importance as an international highway, is scarcely utilised for the local traffic. It is visited by a few steamers, and ascended by barges, which take from 36 to 42 days to reach Quibdo in its upper valley. This stagnation is due to the insalubrious climate of its valley, and the almost total absence of civilised populations along its banks.

The San Juan and Patia Basins.

On the Pacific slope south of Panama the only important watercourses are the San Juan and the Patia. Although not more than about 190 miles long, the San Juan presents with its affluents over 300 miles of navigable waters for steamers, barges, and canoes. Unfortunately, the bars at the mouths of its delta just above Buenaventura have depths of not more than from 5 to 7 feet. The mean discharge is estimated by Vergara y Velasco at 50,000 cubic feet per second, which exceeds that of any other South American river on the Pacific slope.

South of the San Juan follow several other coast streams, such as the Dagua, the Micai, the Iscuande, and the Patia, this last ranking next to the San Juan in volume. It rises east of the Western Cordillera in the Colombia group close to the Cauca, the Magdalena, and the Caqueta. The Sotara, or main headstream, descends from the Sotara volcano south-westwards, receiving the Mayo, Juanambu, Guaitara, and other affluents, from the Western, and especially from the Central Cordillera. The Guaitara, whose headwaters descend from the Pasto volcano and the Tuquerres plateau, is remarkable for its extremely deep and narrow valley, excavated to a depth of 3,000 feet in the limestone cliffs, which are perfectly level above, having been deposited in marine waters at an epoch antecedent to the appearance of the surrounding trachytic rocks.

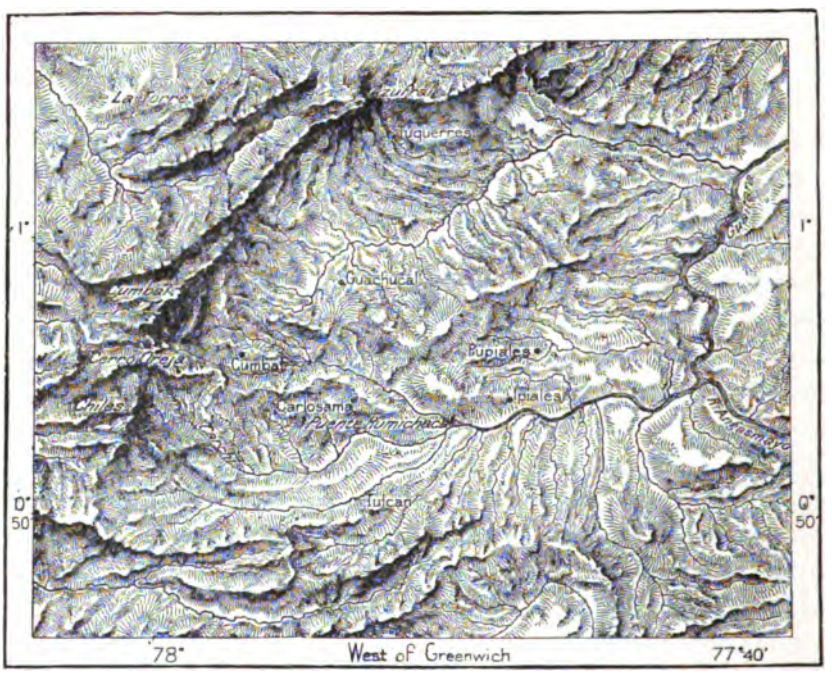
The Rio Carchi, main headstream of the Guaitara, has been chosen as the limit of the conterminous republics of Colombia and Ecuador. At the Rio Blanco confluence the Carchi is crossed on the route from Popayan to Quito by the famous Rumichaca natural bridge, a block of siliceous limestone wedged in between two granite walls. Although formerly known as the "Inca's Bridge," this natural curiosity owes nothing to the hand of man.

After collecting nearly all its tributaries, the Patia plunges into the intricacies of the Western Cordillera, traverses the Minama gorge, not more than 130 feet wide, and debouches on the lower plains through a series of swirling rapids. Beyond the confluence of the copious Telembi, from the Ecuador frontier, the majestic stream rolls seawards in long meanderings through the alluvial plains studded with marshes and now abandoned fluvial beds. Its delta, like that of the

San Juan, projects far beyond the normal shore-line, but is too shallow to admit any but light craft. The lower reaches, however, between the delta and the Cordilleras, might be utilised for navigation if this almost uninhabited region stood in need of any such facilities.

The discharge of all the Colombian rivers flowing to the Pacific and to the Caribbean Sea is estimated by Vergara at 320,000 and 460,000 cubic feet per second respectively, while the enormous quantity of 910,000 cubic feet is sent to the Atlantic, partly through the Orinoco, partly through the Amazons. The annual rainfall being estimated at 73 inches, or 2,500,000 cubic feet for the whole

Fig. 61.—Tuquerres Plateau and Valley of the Guaitara.
Scale 1 : 500,000.



territory, it would appear that about one-third is lost by evaporation, or absorbed by the roots of the plants.

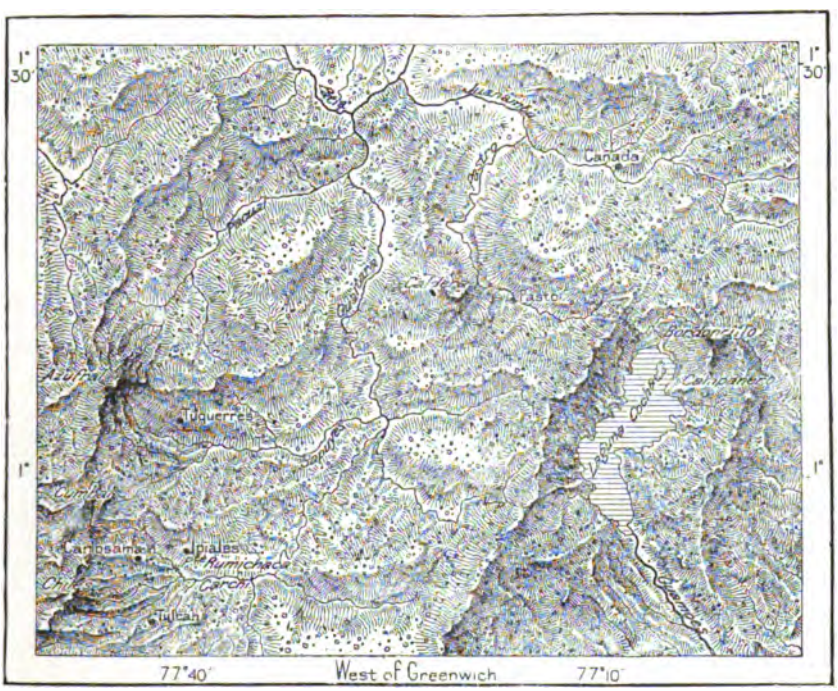
The Colombian Lakes.

At present there are scarcely any lakes in Colombia, unless such shallow riverine depressions as the Zapatosa lagoon are to be regarded as such. But although the lacustrine basins were emptied at an unknown geological epoch, the traces that they have left on the plateaux show that some of them were of vast extent. There can be no doubt that the elevated plain of Bogota was formerly covered by the glacial waters descending from the Suma Paz highlands, but was gradually drained by the erosions of the Funza (Bogota) emissary. The Chibcha (Muysca) Indians appear to have had traditions of this geological fact, for they

relate how the god Bochica had cleft the mountain in twain with his golden wand to let the waters escape over the Tequendama Falls. The most recent outflow from the plateau appears to have been towards the north-west by the Rio Negro valley, where the lacustrine shells left on the terraced margins are still quite fresh.

A few tarns scattered over the plateau still recall the former inland sea. Such are the sacred waters of Guatavita and Guasca, whose beds are supposed to be paved with gems and objects in gold. On certain occasions the paramount chief of the land plunged into the lake all covered with gold dust glued to his skin by the viscous sap of a plant. By laving his body the spirit of the waters accepted

Fig. 62.—Pasto Plateau and the Cocha Basin.
Scale 1 : 1,000,000.



the precious gift, as well as the other costly offerings thrown in by the assembled multitudes. This cacique of the Chibchas was the "man of gold" (*El Dorado*) whom the Spaniards, after finding him on the Cundinamarca plateau, still vainly sought in so many other regions of the New World.

The chroniclers having left on record that, after the loss of their freedom, the Indians cast all their treasures into Lake Guatavita, search was afterwards made, and many precious objects dredged up from the muddy bed. Later attempts were made to drain the basin altogether, and recently its level was lowered by about 50 feet.

The Lake of Fuquene, of which the Rio Saravita is the outlet, and which had formerly an area of 160 square miles, is also disappearing, and at present has a

mean depth of from 8 to 10 feet. The only deep basins now remaining are those of the upland valleys, of which the largest is the Cocha, or "Lake" in a pre-eminent sense. It floods an elevated cirque of the Pasto plateau, source of the Guamoes affluent of the Putumayo, and stands at a probable altitude of over 8,200 feet. The early writers gave the *Mar Dulce*, or *Great Lake of the Mocoas Indians*, as it was called, a far greater area than its real size, some 12 miles long with a mean breadth of less than 3 miles. Although everywhere navigable, with depths of from 15 to 35 fathoms, the Cocha does not give access to the Putumayo, its effluent being interrupted by cascades and in places choked by vegetable growths.

Like Cocha, the Lake of Tota lies on the eastern slope of the Colombian Andes, but drains through the Upia and Meta to the Orinoco. It fills a cirque in the Sogamoso Mountains 9,790 feet above sea-level, and has an area of 24 square miles, with an extreme depth of 180 feet.

Climate of Colombia.

If it is difficult to speak of a Venezuelan climate, the expression, "Colombian climate," can still less be employed except in quite a special sense. A region of such diversified relief, offering in its mountain ranges, plateaux, and terraces such marked contrasts of altitudes and aspects, naturally possesses the whole series of climates alternating with the seasons, and even from day to night. Every valley, every slope has its special meteorological conditions of heat, winds, rains, and atmospheric moisture. Hence the main climatic features can be indicated only in a general way, regardless of the thousand local variations.

In theory the thermic equator coincides with the low-lying Atlantic coast-lands; but here the heats are tempered by the moderating action of the sea breezes, so that the Colombian "hells" lie farther inland. On the seaboard the mean temperature is about 81° Fahr., but on the llanos traversed by the Meta, the Casanare, and the Arauca it rises to 90° and even 91°; on all the open plains at the east foot of the Andes it exceeds 87°, except in the southern regions where begin the great Amazonian woodlands.

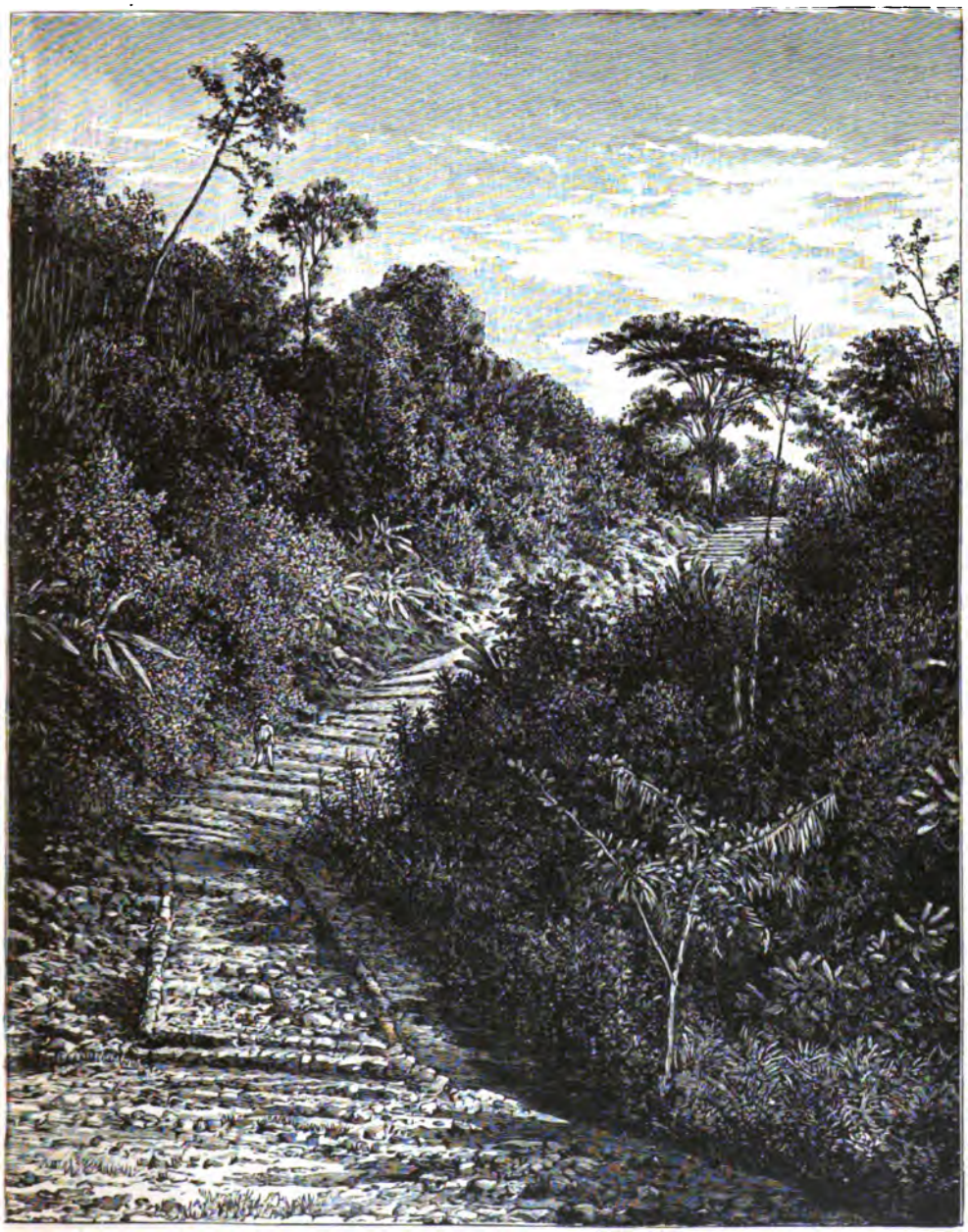
In Colombia proper, between the various cordilleras that ramify from the Pasto group towards the Caribbean Sea, the heats are all the more intense that the cool trade winds are intercepted by the mountain barriers. Thus the lower part of the Upar valley, lying under the shelter of the Snowy Sierra, has been transformed to a sandy and marshy desert, with a mean temperature of 88° Fahr., or 6° or 8° more than on the neighbouring coastlands. At Puerto Nacional, on the Magdalena, the glass has often registered 104° in the shade.

As a rule, the heat is considerably greater on the Atlantic than on the Pacific seaboard. Thus Tumaco, on the south-west coast, not far from the equator, lies under the isothermal of 79°, whereas the Goajira peninsula, washed by the Caribbean Sea, over 600 miles farther north, has a normal temperature of 84°. From this it appears that the influence of Humboldt's cold Pacific current is still felt as far north as the west Colombian coastlands.

Thus relief, aspect, direction of aërial and marine currents are more potent

factors than latitude. From the torrid heats of the lowlands to the arctic zone of the snowy crests, all the transitions are observed, though not in direct ratio to the rarefaction of the atmosphere. The curves of altitude and of temperature

Fig. 63.—Road in the Hot Lands, Colombia.



nowhere run in parallel lines, but are, on the contrary, everywhere interlaced in an inextricable tangle. Speaking broadly, the temperate zone, comprised between 75° and 59° of the thermic scale, includes the largest part of Colombia proper, that is, excluding the llanos. In this zone the cold winds descending

from the uplands and the hot winds ascending from the plains are constantly in collision, producing a state of permanent instability.

Being intercepted or obstructed by the Cordilleras, the trade winds blow regularly only on the shores of the Caribbean Sea, where their fury is intensified by the rarefaction of the air, caused by the high temperature prevailing on these coastlands. Although hurricanes, properly so called, never range quite so far south, the east and north-east gales often assume the aspect of raging storms, driving the surf with tremendous violence against the exposed parts of the sea-board. On the other hand, the rare north winds never acquire the fury of the corresponding *nortes* in the Gulf of Mexico. The so-called *vendavales*, or western breezes, often set steadily along the coast from July to November; but on the high seas they are powerless to resist the force of the trade winds from the opposite quarter. These vendavales are accompanied by a marine current, moving in the same direction, at times with a velocity of over four miles an hour.

On the other hand, the atmosphere often remains perfectly still in the hot inland regions, such as the Rio Cesar basin and the plains watered by the middle Magdalena. But the shores of the Pacific, running north and south between the trade winds of both hemispheres, are often swept by the northern gales, which blow with great regularity during the dry season.

As in other equatorial regions, the seasons are determined by the rains, which in their turn follow the movement of the sun. When it reaches the zenith moisture is precipitated, while clear skies coincide with the solstices on either side of the equator. Thus twice a year Colombia is visited by rain-bearing clouds, and every province has its alternating *veranos* and *inviernos*, wet summers and dry winters. The heaviest showers occur on the seaward slopes of the mountains; but the mean rainfall is far greater than in the temperate regions of Europe. On the Bogota plateau it exceeds 40 inches, rising to 100 on the Atlantic, and much higher on the Pacific slope, as well as in the Atrato and San Juan valleys. Apart from the loss caused by evaporation and plant life, the discharge of the Atrato represents a yearly rainfall of no less than 200 inches. These moist and marshy regions are extremely unhealthy for the white man, the Indian half-breeds, and even for the negroes. They not only remain nearly uninhabited, but they arrest the progress of explorers, and delay the settlement of the breezy and fertile upland terraces, which they separate from the sea-board.*

Flora of Colombia.

The Colombian flora rivals that of Brazil both in the variety of its plants and the splendour of their flowers and foliage. All the Venezuelan and Brazilian

* Climate of some Colombian towns:—

	Altitude. Feet.	Atmospheric Pressure. Inches.	Mean Temperature. Fahr.	Mean Rainfall. Inches.
Honda	664	30	82°	?
Ibagué	4,280	27	71°	?
Medellin	4,950	26	70°	55
Bogota	8,680	23	58°	44
Tuquerres	10,200	22	55°	?

tropical forms here intermingle with those of the Andes and Central America, migrating northwards from the valleys of the Cordilleras, or southwards from the region of isthmuses. Moreover, the middle slopes and elevated plateaux abound in species resembling those of temperate Europe and even of the polar lands.

Palms occur everywhere, but nearly always solitary or in isolated clumps. Even where most numerous, as on the slopes of the Suma Paz cordillera, they never develop continuous forests, but grow intermingled with other trees, in such variety that the botanist André found as many as 25 different species in three days. Next to the coconuts of the San Blas archipelago, those that form the largest groups are the *curuas* of the Upar Valley, and the wax-palms (*ceroxylon andicola*) of the Central Cordillera; in the Quindio district they range up to over 10,000 feet, nearly 6,500 higher than most other members of the palm family, and within 2,600 feet of the snow-line. Some wax-palms shoot up straight and graceful as a reed to a height of 200 feet. A single stem will yield as much as from 16 to 24 pounds of a white or yellowish wax, valued at from 15 to 25 shillings on the Ibangué market, where it is bought for making wax matches. The *ferrugineum*, a smaller but more common variety, grows at lower altitudes, chiefly west of the Choco cordillera and thence southwards to Ecuador. The mauricia palm, the characteristic tree of the Venezuelan llanos, penetrates into Colombia no farther than the plains of San Martin and Casanare.

Of the palms on the slope of the Eastern Cordillera facing the llanos one of the most remarkable is the corneto (*deckeria*), slim and slender as the wax-palm—not, however, shooting directly from the ground, but from a pyramid of aërial roots about 6 or 8 feet high. The fruit, resembling plums in size and appearance, grows in clusters weighing from 120 to 200 pounds. The tagua (*phytelephas macrocarpa*), another variety of palm, growing abundantly on the banks of the Magdalena, Atrato, and Patia, has the appearance of a young coconut-tree; its large fruit. or "negro head," of melon shape, contains numerous grains too hard for the teeth of the peccary or monkey. This is the "vegetable ivory" of commerce. Another useful variety is the *carludovica palmata*, the ribs of whose fan-shaped leaves are used for making the so-called "Panama hats."

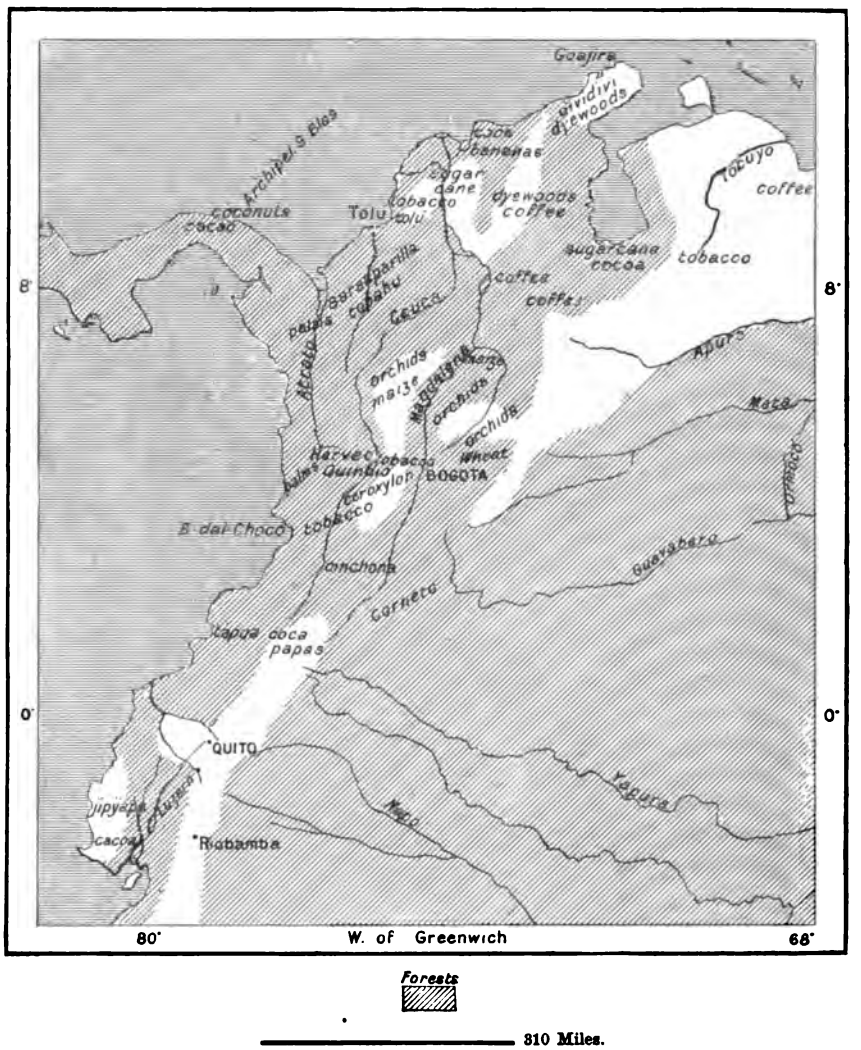
Scarcely less numerous than the palms are the *macanas*, or tree-ferns, 32 varieties of which were recorded by Lindig in the section of the Andes lying north of the equator. They range from 650 up to 10,000 feet, that is, far beyond the limits assigned to them by Humboldt. Near Fusagasuga the stems are used for making the so-called *empalisados* ("palisaded roads"), where but for these "sleepers" the wayfarer would run the risk of disappearing in the quagmires. The bamboo (*bambusa guadua*) has even a still higher range, occurring in clumps nearly as high as 15,000 feet, in association with the velvety *espeletia*.

The cactus of the torrid lowlands and the espeletia of the snowy plateaux intermingle about midway on the mountain slopes, for Ancizar met "Barbary figs" of vigorous growth as high up as 8,640 feet. The *befaria*, or American "Alpine rose," resembling the European rhododendron, grows to a height of 5 or 6 feet, with a range from 9,000 to nearly 11,000 feet.

Besides several indigenous alimentary plants, such as the arracacha (racacha), or celery of the Andes, the Colombian flora is distinguished especially by the great variety of its medicinal species. The cinchona is essentially an Andean growth, flourishing chiefly between 7,900 and 9,800 feet, in association with the superb red cedar. The first systematic study of the quinquinas (Peruvian bark)

Fig. 64.—Chief Vegetable Products of Colombia.

Scale 1 : 15,000,000.



was made in New Grenada by the botanist Mutis, who published the result in 1793. Since that time explorers have discovered several other members of the family, whose bark, however, is for the most part destitute of any febrifugal properties. On the other hand, Colombia possesses several other equally efficacious plants, such as the cedron (*sinabra cedron*), highly esteemed by the natives as a tonic; Saffray even asserts that it is far superior to quinine against nervous inter-

mittent fevers, the scourge of the Colombian hot lands. The cedron is also believed to be an antidote against poison, like the *aristolochia ringens*, the *guaco* (*mikania*), and a dozen other forms.

The Indians are acquainted with plants which yield fast dyes, but the only dyewoods at present exported are the roco (*bija orellana*), and some "red" and "yellow" woods, of the same species as those of Brazil, Nicaragua, and Campeachy. Timber, such as that of the oak and of so many other species peculiar both to the tropical and temperate zones, is scarcely used even on the spot. The systematic destruction of plants yielding rubber and bark is trifling compared with the havoc caused in clearing land for permanent or temporary settlement. Thus are formed the so-called *pajonales*, vast grassy savannas, which replace the primeval forests on the higher slopes of the Cordilleras.

Even the orchids, of which Colombia possesses some of the very finest varieties, are threatened with extinction by the European and American collectors. Some of the most gorgeous specimens have already become extremely rare, and districts which formerly abounded in these forest glories now yield only a few ordinary forms after days of search. One of the collectors tells us that during a campaign of two months he had 4,000 trees felled to secure about 10,000 of the *odontoglossum*;* and of these how many perished before reaching their destination? Henceforth the species will have to be perpetuated chiefly in the European conservatories, where they never assume the brilliant hues and wondrous shapes that they develop in their native woodlands. Fortunately, the simpler but often very lovely wild flowers, which are not bought for their weight in gold to adorn the European gardens, will still survive. Such is the *thybaudia*, or *quere me* ("love me"), which is found only near Cali, in the Salado valley, and which the lads and lasses exchange in token of affection.

Fauna of Colombia.

The Colombian fauna, no less rich than its flora, is specially distinguished for the amazing variety of smaller animal forms, birds, fishes, and insects. Like North America, this region had also its gigantic mammals, whose numerous remains are found, amongst other places, in the Campo de Gigantes ("Giants' Field"), on the Bogota plateau. The Zulia valley also abounds in the bones of megatheriums, glyptodons, taxodons, and fossil horses. According to some naturalists the mastodons would appear to have survived till recent times on the elevated plateaux. The complete skeleton of one of these animals has been discovered in an artificial salt-spring of Indian construction near Concordia, west of the Rio Cauca. It had evidently been overwhelmed by an enormous landslip, and was found lying in the stone channel through which the salt water was conveyed to the boiling-house. The tusks measured five feet in length, and were in a good state of preservation.†

The present mammals—such as apes, bats, and vampires; pumas, jaguars, and

* Albert Millican, *Travels and Adventures of an Orchid Hunter*.

† R. B. White, *Journal of the Anthropological Institute*, February, 1884, p. 244.

other felines; bears, sloths, and ant-eaters; tapirs and peccaries—all belong to the same species as those of Venezuela and Central America, as do also most of the birds. Nevertheless, certain species have a very limited range, conditioned by the presence of certain trees or flowers. Hence any slight disturbance—a fire, a clearance, erosions, or landslips—will at times suffice to cause their disappearance. The Sierra Nevada de Santa Marta, which is probably of very old geological formation, has its own little floras and faunas, including at least five special varieties of the humming-bird collected in this district by Simons.

The variety, gorgeous hues, and eccentric forms of the insects present a remarkable analogy to the richness, beauty, and strange shapes affected by so many of the orchids. Colombia is a veritable paradise of entomologists: certain districts have become famous for the myriads of their magnificent butterflies. Such especially is the Muso valley, north-west of Bogota, in the upper Minero basin, where popular superstition has traced some mysterious relation between the mineral emeralds asleep in the rocks and the living emeralds flitting in the air.

It is difficult to form any adequate idea of the prodigious multitudes of these "winged gems"; calculations have been made that certain clouds of butterflies, such as those at times shrouding the seaward slopes of the Santa Marta Nevada, must contain trillions of insects. On such occasions the teeming life of the atmosphere corresponds with that of the neighbouring waters, which at certain times are coloured entirely yellow for many hundreds of square miles by myriads of small jellyfish. At certain seasons of the year the fish ascend the Atrato in such dense shoals that the surface waters become agitated, as if obstructed by formidable rapids.

On the plains and in the open valleys the several animal species generally occupy wide domains round about the mountain ranges, but, like those of the vegetable forms, these zones are superimposed on the surrounding slopes. Thus the monkeys of the tropical forests never ascend to the cold regions; above 6,000 feet the traveller is safe from the fangs of venemous snakes, and fleas and many other parasites, as well as birds and butterflies, are similarly limited in vertical range. A solitary species of humming-bird, the *steganura underwoodii*, whose feet are well protected by a fluffy white down, penetrates as far as the bleak páramos. But high above the loftiest summits soars the *buitre*, or king vulture (*sarcoramphus papa*), a superb yet repulsive creature, decked in gaudy colours, who swoops down from the depths of the heavens on the fallen quarry, and gorges on the choice parts, encircled by eagles, carrion hawks, and other birds of prey respectfully awaiting the end of the royal banquet.

Certain restricted zones can be explained neither by altitude nor by any special conditions of soil or climate. Thus the domain of the mosquito is abruptly limited in the districts of Villanueva and other villages of the Upar Valley, where there is nevertheless no lack of marshy waters. On leaving the village the traveller sees dense clouds whirling in the air, but always stopping short of a certain tree or some such landmark, beyond which he need not fear their attack.

Despite the heavy rainfall and vast woodlands, certain regions are at times

MUYSCA INDIANS, ADORNED WITH ANTIQUE JEWELLERY.

invaded by hosts of locusts, as in 1825, when the Cauca valley was wasted; not a blade of grass was left for the cattle, sheep, and goats, which were driven to devour the grubs and young locusts. Pigs and poultry also surfeited on the same food, so that milk, eggs, meat, everything acquired a sickening flavour of musk, and reeked of grasshopper.

Inhabitants of Colombia.

The present Colombians descend, for the most part, from the Indian peoples occupying the land at the advent of the Spaniards towards the middle of the sixteenth century. How the natives were treated by the ruthless Conquistadores is a twice-told tale of savage massacres and frightful atrocities. Wholesale butcheries, dire oppression, epidemics, and especially weariness of life, swept away hundreds of thousands. The *adelantado* Jimenez de Quesada, the same who had conquered the plateau, testified thirty-nine years afterwards that where he had found 2,000,000 of inhabitants there then survived only the wreck of a few wretched tribes. But from these humble remains, crossed to a slight degree by European elements, has sprung the Colombian race, a young shoot from a felled stem.

Although all the nations formerly inhabiting the land have contributed to the formation of the Hispano-Colombians, these claim as their forefathers chiefly the Muyscas of the plateaux between the Magdalena and the Suma Paz cordillera. It was natural that preference should be given to those Indians who had already developed an advanced civilisation, and who have left a name in history. In any case, Cundinamarca, land of the Muyscas, included at the time of the Conquest not only the present province of that name, but also all the uplands east of the Magdalena as far as the Sierra Nevada de Merida, in the neighbouring state of Venezuela.

The Muyscas, that is, "Men,"* also bore the alternative name of Chibchas, from the frequent recurrence of the *ch* sound (as in *church*) in their language. According to the national legends they were still barbarians, ignorant even of the arts of tillage and weaving, when a youth of fairer features than their own came to teach them the crafts and industries. This civiliser, often confounded with the god Bochica, had also given them a complete political constitution, and at his death appointed his two sons, or those of his sister, one as the spiritual, the other as the secular and supreme chief.

The Muyscas worshipped the heavenly bodies, all of which, as well as the forces of nature, were personified. Altars were raised to them in the open, and to their temples were brought offerings—gold, stuffs, precious stones, even living victims. A wayfarer passing by a mountain, a rock, or a plant, and hearing its voice in fancy, would forthwith prostrate himself in worship of the mysterious life thus revealed, and henceforth a new deity was added to the multitude of gods. Above them all stood Bochica, the universal spirit and supreme master, who had entrusted the whole earth, and especially Muyscaland, to Chibchacum, "Wand of

* From *Mu-isca*, "body-five," *i.e.*, body of five extremities, apparently in reference to the five-fingered and five-toed hands and feet used in counting.

the Chibchas." Like another Atlas, Chibchacum bore the globe on his shoulders, and when he changed position to ease the burden the earth quaked.

At the time of the Conquest the territory was divided into numerous distinct states—Cundinamarca proper, that is, the country between the Rios Fusagasuga and Sogamoso, forming a northern and a southern kingdom, with respective capitals—Muequeta (Funza), and Hunsa, the present Tunja. A separate district, Iraca, was also set apart for the high priest. The *zipa* and the *zaque* (kings of the south and north) were at war when the Spaniards arrived, and soon after Hunsa was captured by the more powerful zipa.

Both were absolute rulers, though not by mere hereditary right. The future heir was chosen amongst the sons of the reigning prince's sisters, and carefully brought up in a temple, where he was allowed neither to see the sun nor to taste salt. The king had but one consort, but over 2,000 concubines, and when he issued from his palace to visit the temple, distant only "three shots of an arquebuse," the procession was made with such pomp and majesty that he took three days to cover the ground.

The deference paid to the zipa resembled that of the slavish subjects of Eastern despots. No one dared look him in the face. When addressed, the speaker's back was turned towards him, and the bearer of presents approached on all fours. The severest sentence of a culprit was to have to face the king, by the rays of whose awful majesty he was struck as by lightning; henceforth no one spoke to him, and he perished forsaken by all. At the zipa's death all went into mourning, daubing themselves with red ochre. The body, embalmed with a kind of resin, was placed in the stem of a palm which was embellished with plates of gold. The deceased was also decked with gold and emeralds, and was followed to the after-life by a few slaves and devoted women.

The *uzaques*, or secondary chiefs, also possessed great power over their subjects, and the honours paid to them were accompanied by analogous ceremonies. Their rank was also transmitted through the sister's line, and at the succession they were covered with gold plates and crowned with plumes. Yet the old matriarchal traditions allowed the spouse to chastise her princely husband, though the stripes were limited to eight, even for crimes for which his subjects would be punished with death.

The high priest of Iraca, or Sogundomuxo, resided near Suamoz, the present Sogamoso, in a mysterious recess inaccessible to the vulgar. He was chosen, not by inheritance, but by election; which, however, was limited by custom to two princely families. But the *xeques*, or ordinary priests, inherited their office through the sister's line in the same way as the royal dignity. During his novitiate of twelve years the xeque was committed to the charge of an elderly priest in a *cuca*, or seminary, where the diet was limited to what was absolutely necessary to keep body and soul together. At critical times of national danger the xeque led a solemn procession of the people before dawn to the top of a lofty mountain, where, turning to the rising sun, he sacrificed a child captured from the enemy. The victim's throat was cut with a sharp reed, and the blood smeared over the

rocks struck by the first rays of the sun, and the body was then left to be consumed by the heat of the day.

Like the Mexican priests, the xeques proclaimed every new cycle of fifteen years with a human victim, always a young man native of a village situated on the eastern plains, whence Bochica had first made his appearance on the plateau. The

Fig. 65.—Muysca Idol.

victim represented the god, and in a public procession had to follow the same route followed by Bochica. The priests, disguised as divinities, demons, and animals, pierced the young man with arrows, and before his last gasp, tore out heart and entrails, which were exposed to the sun.

At the advent of the Spaniards the Muysca empire was already in a state of decadence. The national life had been stifled by a system of rigid laws and by

the division of the people into exclusive social castes. Of these the first was that of the priests, at once magicians, medicine-men, judges, and executioners. Then came the warriors, who during peace were charged with the functions of police and the collection of the taxes. The third and fourth classes comprised the traders with the artisans and the peasantry, who in time of war were held to military service as simple soldiers, incapable of rising to the rank of chiefs. A fifth class included the nomads, for the most part conquered tribes, differing from the Muyscas in speech and usages.

Private property was established on a very solid base. Defaulting debtors were condemned to pay double the amount, and the creditor, if a person of distinction, sent a tame bear or jaguar to the house of his client, who had to feed both the animal and its keeper till the debt was discharged in full; otherwise his hearth was quenched with water, and he himself enslaved. Robbers lost their eyes, either burnt out by means of red-hot metal plates, or, in case of serious theft, torn out with thorns. The penalties imposed on the lower orders were always of a nature to enrich their betters, while the upper classes, regarded as men of honour, more sensible to disgrace than to torment, were simply degraded. They received names usually reserved for outcasts, their hair was cropped, their clothes torn, and at times they were sentenced to be whipped by their wives.

Although the industries were fairly well developed, these Indians had no knowledge of iron, and made their agricultural implements of wood or stone; hence the ground could be properly tilled only in very wet seasons, so that prolonged droughts were inevitably followed by famine. On the plateaux little was cultivated except maize, potatoes, and *chenopodium quinoa*, a goosefoot yielding edible seeds; lower down, but still in the temperate zone, manioc and arracacha were the staple products.

Thanks to their copious salt-springs and rich gold-mines, the Muyscas were able to procure abundant supplies from the inhabitants of the plains, with whom they traded far and wide. The chief market was held in the upper Magdalena valley, in the territory of the Poincos (Yaporogos), not far from the present town of Neiva. In their commercial transactions the Muyscas made use of a gold currency in the form of cast discs, an almost solitary instance of a metal coinage properly so called amongst the aborigines of the New World.

The Muyscas were tolerably skilful workers in gold, which they wrought into grotesque little figures of men, frogs, and other animals, thousands of which are preserved in the museums of Europe and America, despite the wholesale destruction of these objects by the iconoclastic missionaries of the sixteenth and seventeenth centuries, who supposed them to be consecrated to demon worship. They also executed carvings in relief on hard stones, and in the collections may be seen four- and five-sided slabs of basalt, with symbolical figures in which some archæologists have recognised the signs of the calendar.

But although their territory abounded in minerals of all kinds gold was the only metal they had learnt to extract and work. One of their most highly developed industries was weaving, their looms producing an extremely durable

cotton fabric, which the artists embellished with brilliant designs. The houses, built of wood and clay with conic roofs, were poorly furnished; but the temples of the gods and the palaces of the kings and priests contained objects worked with great care. They appear to have even raised stone structures, and certain buildings on the hills of Leiva east of the Rio Saravita were supported by sandstone columns. The materials of what seemed to Velez to have been a large city built of stone have been utilised in the erection of the church and various houses in Moniquira. As amongst the nations of the Old World professing religions with sanguinary rites, the Muyscas sought the favour of the gods for their buildings by cementing them with human blood. They hoped to build for eternity by fixing each support in the body of a fair young maiden, or of a valiant foe.

They also laid out paved highways, and towns, fortresses, places of pilgrimage were approached by well-constructed roads carried over marshes, precipices, and other obstacles. A main route was said to have run from Sogamoso for "a hundred leagues" in the direction of the eastern land whence came Bochica; vestiges of this road were still to be seen in the seventeenth century.

Time was divided into months, and ten periods of three days, or three of ten days. According to Oviedo, the first third of the month was set apart for religious worship and "the exercise of the virtues," the second for work, and the third given up to rest and recreation. The great agricultural periods of sowing and reaping were preceded by "rogations," during which the people disguised themselves as wild beasts, regarded, perhaps, as the guardians of the fields. But the great feast was that of the sun, kept every fifteenth year. The moon also was worshipped with much solemnity, and on stated occasions received messages from the priests conveyed by parrots, which, before being sacrificed, had been taught to repeat the words of the communication.

As amongst so many other peoples, marriage was an affair of purchase, the wooer sending to the young woman's father a mantle corresponding in costliness to his means. At the wedding the bride was asked by the priest whether she loved Bochica better than her husband, her husband better than her children, and her children better than herself. But Bochica often exacted his victims, and as the eldest child had to be a son, all girls born before him were put to death, as was also one of twins.

The sick were well cared for, and great respect was shown to the dead. Shadowland was situated in the centre of the earth, and was reached by the gossamer souls of the departed by crossing a large river in a boat made of the threads of a spider, regarded as a sacred insect. The funeral rites, both tedious and costly, varied with the castes and districts; in some places the disembowelled bodies were filled with precious objects; in others they were exposed on platforms round about the temples, or else dried in the sun. Certain caves contained hundreds of bodies, all seated in circles with their hands joined. Valiant captains were embalmed and borne before the armies to ensure the victory.

At present the Muyscas, merged in the Hispano-Colombian race, have completely disappeared as a distinct nation. For over a century the language has

ceased to be spoken, although to a great extent rescued from oblivion by the grammarians.* The uncivilised branches of the Muysca family—Tocaima, Analoima, Anapoima, Coyaima, Natagaima, and others, who were collectively known as Panches, and who dwelt chiefly in the valleys south of Bogota—have also long ceased to be mentioned. All these natives went naked, and, according to the statements of the first conquerors, were still addicted to cannibalism.

The Colimas, that is "Cruel," who occupied the Rio Negro valley north-west of Bogota, and the Musos, other neighbours of the Muyscas in the upper Minero valley, recognised neither chiefs nor judges, and settled all wrongs by the *lex talionis*. They were said to commit suicide on the slightest mishap, and in any case most of them preferred death by rushing over rocky precipices rather than submit to the Spanish yoke.

The Coconucos, Chocos, Goajiros, and other Aborigines.

Besides the independently developed Muyscan culture, a second centre of civilisation had been created by the inhabitants of the Pasto and Tuquerres plateaux, and of the upper Cauca valley round about Popayan, under Peruvian influences. These peaceful and gentle populations dwelt in large and beautiful villages, some of which were built of houses over a hundred yards long, spacious enough to accommodate as many as a hundred families under one roof. But these Indians, the most timid of all the Colombian races, offered far less energetic resistance to the Spaniards than the more warlike Muyscas. They are even said to have hanged or starved themselves to death on hearing of the near approach of the whites, so that the route to Popayan was indicated by the multitudes of dead bodies strewn along the track.

In the dialects of the tribes that have reverted to the savage state in the Cauca valley, and especially in that of the Coconucos of the Popayan district, there occur numerous Quichua terms, plainly showing that Peruvian influences had extended, through trade and the industries, hundreds of miles to the north of the political frontiers of the Inca's empire. But farther on, in the direction of the Atrato and of the Panama Isthmus, the scattered tribes of diverse speech had remained unaffected by the civilising action of the Quichuas. They were, at the same time, too far removed from the Aztec and Maya worlds to be influenced by those cultures in their intellectual and moral development. Thus both from the ethnical and geographical standpoints the northern and southern continents were completely separated by the Atrato valley. The territory of the Cuna savages intervened between the Guaymi and Choco peoples, the former representing the southernmost limits of Aztec culture on Chiriqui Bay, the latter the northernmost extension of Inca influences in Colombia.

The Choco nation, comprising the Baudo, Citarae, Noanama, Tado, and many other tribes, occupies all the western parts of Colombia in the Atrato and San Juan valleys, and thence southwards to Ecuador. They also hold the northern

* E. Uricoechea, *Gramatica i vocabulario de la lengua chibcha*

spurs of the Cordillera on the Atlantic side, the approaches to the plateaux of Antioquia, and even some districts in the Central American isthmus. To the same ethnical group belong the various tribes of the Catios, between the Atrato and the Cauca. Of all the Colombian wild tribes the Catios are perhaps the least advanced in the social scale. In the marshy tracts of the lower Atrato they were said to dwell in the branches of trees, like the ancient Guaraunos; they mostly went naked, and "fattened their prisoners of war for the table." At present they are reduced to a few wretched fragments, who avoid contact with the whites,

Fig. 66.—Chief Indian Nations and Tribes of Colombia.
Scale 1 : 15,000,000

although their speech is daily becoming more charged with Spanish elements. The day is probably not distant when the Chocos, like the Quichuas of Popayan and the Muyscas of Cundimamarca, will speak the language of the Conquerors.

The Nutabé and the Tahami of Antioquia, the former between the Cauca and the Porcé, the latter in the mountainous region between the Porcé and the Magdalena, resembled the Muyscas in their customs and social state. They also practised a rudimentary agriculture, manufactured earthenware, wove and dyed cotton stuffs. Although they have left no such name in history as their neigh-

bours beyond the Magdalena, they appear to have rivalled them in knowledge and general culture. The oblivion into which they have fallen is doubtless due to the fact that they obeyed no powerful kings, and had failed to develop a warlike empire. The Spaniards, subjects of an emperor who aimed at universal dominion, estimated the civilisation of the aborigines according to the extent of the domains ruled over by their chiefs, and the wealth contained in their treasuries.

Yet the plateaux of Antioquia surpassed Cundinamarca in auriferous deposits, and consequently the graves of the Nutabé and Tahami Indians have in the end yielded far more golden treasures than those of the Muyscas. But they are scattered over a wider area, and not grouped round a few sanctuaries visited by hundreds of thousands of pilgrims, bearers of offerings to the gods. The *huaqueros* of Antioquia, that is, the rifiers of *huacas* (barrows), are very skilful in selecting amongst the inequalities of the ground those which contain human remains, and the treasures deposited with them. In 1833 a single huaca yielded jewels to the value of £3,600

The marshy valleys draining east of Antioquia towards the Magdalena are inhabited by a few remnants of the Pantagoros, a people formerly much dreaded by the Spanish settlers. Amongst the various tribes that roamed the dense forests on this slope of the Central Cordillera the most barbarous were the Pijaos (Paes or Paezes), who selected the most innocent victims as offerings to their gods. The enemy slain in battle was regarded as a poor sacrifice compared with women, children, inoffensive strangers, and other harmless beings, who were accordingly immolated to the spirits thirsting for blood. But even such victims could secure the divine favour only for a certain period; hence the sacrifices had to be periodically renewed at the risk of being abandoned by the neglected deities.

Although possessing less gold than the Muyscas and Tahami, the civilised Guanes, of the upper Sogamoso basin, were more richly endowed in the qualities of courage, endurance, and probity. Some of their descendants, known under various names, still occupy the Carare valley, where they are protected from the whites by the unhealthy climate and dense forests of their territory.

In the Sierra Perijaa dwell other wild tribes, such as the Chimilas, accused of cannibalism without any proof, and the Motilones, of Carib stock, who occupy the hilly frontier district east of the Rio Cesar. These still hold aloof from the settled populations, whereas the Arhuacos (Aurohuacos), of the Sierra Nevada de Santa Marta, have already begun to associate with and speak the language of the Conquerors, while still preserving their mother tongue.

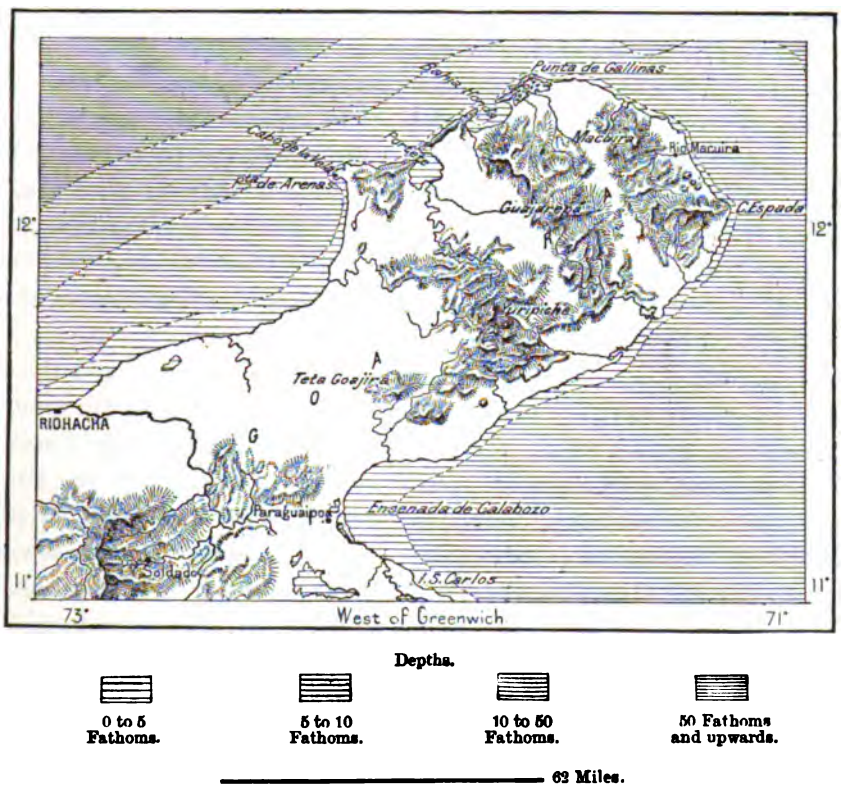
The Goajiros (Guahiros of the early writers), who occupy the plains east of the Rio Rancheria, between Rio Hacha and Maracaibo, are physically a much finer race than the Arhuacos, taller, more robust and active, and especially distinguished by a much lighter complexion. This feature has been attributed to a more carnivorous diet, their arid territory yielding no fruits or vegetables, and compelling them to depend mainly on their herds, and on the turtles which

they capture in large numbers. Usually the Goajiros go naked, donning a cotton mantle only when they visit the frontier market towns. Their physical appearance, speech, and haughty bearing show that they are an isolated branch of the Carib race.

Although they now keep aloof from the Colombian whites and half-breeds, the Goajiros appear to have formerly shown themselves well disposed towards the Spaniards. Their various tribes, occupying the Goajira Peninsula and the shores of Lake Maracaibo as far as the Merida and Trujillo mountains, had accepted the ministration of the missionaries, and even called themselves

Fig. 67.—Goajira Peninsula.

Scale 1 : 2,300,000.



"Christians." More intelligent and industrious than most other Indians, they became the most useful allies of the Spaniards, but were driven to revolt by the greed and lust of the whites. The abduction of some Goajiro women was followed by a general rising of the Indians, who wasted the plantations and destroyed the houses of the settlers, and even killed many of the residents of Trujillo. Since the end of the sixteenth century, when these events took place, the Goajiros, solemnly abjuring the religion of their oppressors, have maintained their freedom in the Goajira Peninsula. After expelling all strangers, they constituted the Rio Rancheria an impassable frontier towards Colombia, and these

limits are never violated except on market-days, when the Goajiros visit the fairs on the Colombian side.

If civilisation is to be measured by the social position of woman, the Goajiros must be ranked amongst the most advanced nations. They show the greatest consideration for their wives, who are consulted on all occasions, and who can interfere to stop quarrels by seizing and breaking the weapons of the combatants, and throwing the pieces away. A traveller passing through the country under the escort of a woman will be respected and well entertained by everybody.

Formerly the Goajiros were divided into tribes, each with its totem, like the North American redskins, and all regarded themselves as the descendants of some sacred animal, such as an ape, a hen, or a partridge. The chiefs, whether men or women, rule, not by right of birth or conquest, but in virtue of their wealth in herds. For them alone are still observed the old funeral rites, which are accompanied by the sacrifice of many calves and colts, and by copious libations.

Besides the true Goajiros, numbering some 30,000, their territory is also occupied by the so-called Cocinas ("Plunderers"), who, perhaps, belong to the same race. But most of them have been reduced to a state of servitude, their duty being to tend the cattle, to build the ranchos, to prepare the poisoned arrows, to cultivate the fertile valleys of the eastern uplands. The chief wealth of the Goajiros consists in their horned cattle and horses, large numbers of which are brought to the markets of Rio Hacha, Sinamaica, and Maracaibo.

About one-half of the territory comprised between the Andes and the rivers Orinoco, Cassiquiare, and Rio Negro is occupied by tribes which are even more independent than the Goajiros. Several of these tribes, such as the Tunebos or Tammes, who formerly dwelt on the plateaux, have descended to the llanos in order to preserve their liberty. But this chaos of fugitive and nomad peoples has no political importance whatsoever, and even numerically represents scarcely a fiftieth part of the Colombian nation—at least, according to the general estimates. In other words, the spaces occupied by them are still almost uninhabited, and these wild tribes, without having suffered any direct oppression, are perishing from the small-pox, scarlet fever, and other epidemics introduced by the whites.

In ethnological writings the names occur of dozens of such decimated tribes, each comprising a few hundred, or, at most, two or three thousand souls. One of the most important are the Salivas, akin to the Betoyes and Vichadas, who cultivate a few patches of land on the banks of the Meta, the Casanare, and their affluents. Eastwards their territory is conterminous with that of the Quivas, who appear to have escaped from the Colombian plateaux in order to avoid contact with the whites. The Salivas are a musical people, who have invented a kind of terra-cotta French horn five feet long, with which they emit lugubrious notes, heard at a great distance.

Another numerous tribe are the Mituas, of the Rio Guaviare, who occupy the lowest rung in the social scale; their women weave a kind of felt resembling amadou, which is of too coarse a texture to hang in folds round the body. On

the lower Guaviare, below the Mituas, follow the Papiocos ("Toucans"), one of the many peoples amongst whom the curious custom of the couvade still survives.

The Mocoas of the upper Caqueta, east of Pasto, dwell in the forest glades, and are held to be civilised because they speak the Quichua (Peruvian) language mixed with a few Spanish loan words, and because they visit the settlements always arrayed in violet-coloured garments. But farther down, along the Yapura and Putumayo rivers, are scattered several primitive groups who still go naked, and preserve their native languages. All are of peaceful disposition, and are distinguished by their ornaments, the cut of their hair, or even by mutilations regarded as embellishments. The Mataquajes (Piajes), who pluck out their eyelashes and eyebrows and pierce the cartilage of the nostrils; the Orejones ("Long-eared"), who cut the lower lobe of the ear into strips, and the Encabellados, who build up the hair into huge crested helmets—all roam the debatable borderlands between Colombia, Ecuador, Peru, and Brazil.

Some of these sedentary or nomad groups, such as the Papiaros, the Bamias, the Yaruros, and most of the middle Orinoco people, are classed with the Maipure family; others, like the Carizonas of the upper Yapura, and the Uitotos widely diffused throughout the Yapura and Putumayo basins, are regarded by Crevaux as pure Caribs, while the Miranhas, of the middle Putumayo, appear to form a separate group speaking a stock language.

The Hispano-Colombians.

The civilised inhabitants of the plateaux and upland valleys, in whom the European and aboriginal elements are completely blended, present certain contrasts, due to the different environments and to the preponderance of one or other of the primitive stocks. Thus the Cundinamarcans, Muysca and Andalusian mestizoes, are noted for their clear vision, impulsive action, and lack of perseverance. The Pastusos, with some Quichua blood in their veins, have the same patient, long-suffering, cautious, but sullen and revengeful spirit as their southern kindred. Ever mindful of the past, and clinging to the old usages, they have always represented the conservative element in a pre-eminent degree in the republic.

On the other hand, the people of the Cauca valley, the most healthy and flourishing district in Colombia, are hospitable, open-handed, full of sympathy and pity for the weak. Their country has received the quaint name of "the gentle land of Yes," being a people who "can never say No" to supplicants. But they are impulsive and passionate, flying to arms on the least pretext, qualities due to a large strain of negro blood.

The natives of Antioquia are said to have a considerable admixture of a Semitic element, derived from a number of Jewish converts taking refuge in the New World from the persecutions to which they were subjected in the Old. In any case, the Basques are largely represented in the Antioquian population, which is

distinguished by its vigorous constitution, intelligence, and shrewdness in business matters. No other section of the Colombian nation has increased more rapidly, having risen from about 100,000 at the close of the last century to over 1,000,000 in 1892, despite the numerous emigrants to every part of the republic. Should they continue to increase at the present rate, the Antioquians will constitute the chief section of the Colombian population long before the close of the twentieth century.

In many respects the Socorrans, who occupy the Santander uplands, show a marked resemblance to the Catalanians. Like them, they are extremely thrifty, laborious, usually taciturn, skilful tillers of poor land, and clever craftsmen. Like the Antioquians also, they emigrate in considerable numbers, founding little agricultural settlements in various districts, or seeking employment on the coffee plantations of Cucuta and elsewhere.

On the Atlantic and Pacific coastlands the negro element has held its ground, and even increased at the expense of other races in the struggle for existence. Certain pursuits, such as those of bargemen, stevedores and day labourers, are almost monopolised by the *Sambos*, as all half-breeds are called in whom black blood is dominant.

Topography.

Although the Rio Magdalena is the great artery of the republic, its main commercial highway as well as the natural link between the various provinces, its basin is still but sparsely peopled. So far from having recovered the teeming populations which it possessed at the time of the Conquest, it offers, after three centuries of Spanish occupation, more ruins than flourishing cities. Most of its towns and villages had even to be rebuilt after the wars of extermination which ended in the destruction of the Andaqui, Yalcones, and Pijaos Indians.

San Agustin—Timana—Neiva—Fusagasuga.

San Agustin, most elevated town in the Magdalena valley (5,360 feet), lies in a secluded corner of a vast territory where the Andaqui formerly assembled for their religious celebrations. From the still extant remains of a temple, converted by treasure-hunters into a mass of shapeless ruins, it may be inferred that the structure consisted of a huge basalt slab resting on pillars and masking an underground recess. Coarse sculptures, representing human and animal figures—amongst them that of the frog, one of the commonest idols in the North Andean regions—occur at intervals, forming so many stations, at which the pilgrims stopped to recite some prescribed formulas. The ruins date probably from an epoch anterior to that of the Muysca civilisation.

Some six miles east of San Agustin, in the opposite direction to the temple and line of idols, is situated the so-called *Llano de la Matanza* ("Field of Slaughter") where a multitude of Andaqui were butchered by the Spaniards, who were thus

COLUMNS OF AN INDIAN TEMPLE AT SAN AGUSTIN.

able to plunder the shrines and carry off their gold statuettes without fear of further disturbance.

Timana, north-east of San Agustin, but at a much lower elevation (3,500 feet), is surrounded by extensive plantations. This was the first Spanish settlement in the district; but its founder, unable to defend the place, fell into the hands of an Indian princess. *La Plata*, another town, so named from its long profitably worked silver-mines, was also destroyed by the Pijaos Indians, and had to be rebuilt on another site, all trace of the mines having disappeared. Till recently over 3,000 families of Timana, *Naranjal*, and neighbouring districts derived a comfortable income from plaiting nacuma straw hats; but the fashion has changed, and other local industries have also been partly driven from the market by imported goods.

Neiva, capital of the old state and present department of Tolima, lies at an altitude of 1,540 feet on the right bank of the Magdalena, at the head of the fluvial navigation for boats and even occasionally for steamers. Founded in 1550 at the confluence of the Rio Neiva, whence it takes its name, it was destroyed, like Timana and La Plata, by the Pijaos; but it was rebuilt by the Spaniards 15 miles lower down on the well-chosen site which it at present occupies over against the three sparkling crests of Huila. One of the most frequented highways in Colombia runs from Neiva round the southern foot of this group and over the Guanacas Pass down to Popayan.

Neiva, which yields a much-esteemed cacao, is surrounded by plantations, and the lower slopes of the eastern hills have also been cleared of their forests to make place for the cultivation of guinea-grass (*panicum maximum*). Till lately the forests of the neighbouring cordillera produced large quantities of cinchona. The settlement of *Colombia*, some 60 miles north of Neiva, was even founded for this industry, which, however, is now much decayed; nevertheless, some fresh plantations have recently been made to replace the recklessly destroyed cinchona trees.

Aipe and *Natagaima*, so named from extinct local Indian tribes, are followed by *Purificacion* and *Guamo* along the left bank of the Magdalena. Between the last two the mainstream is joined by the copious Rio Soldaño, in whose basin lie the market-towns of *Ortega* and *Chaparral*. Below the confluence *Espinal* occupies a favourable position near the left bank of the Magdalena, some 12 miles above the Flandes or Girardot bend.

Fusagasuga, which takes its name from the affluent on which it stands, lies at an altitude of nearly 5,900 feet, at the entrance of a pass leading over the Suma Paz Cordillera, down to the Humadea valley and the eastern plains. This was the route followed in the inverse direction by Fredemann in 1537, when he penetrated from the llanos to the uplands of Cundinamarca. Fusagasuga, the centre of extensive coffee plantations, is much frequented by orchid-seekers, naturalists, and antiquarians. Some huge erratic sandstone boulders at *Chinauta* and *Anacuta* are inscribed with exceedingly intricate characters, which have not yet been deciphered.

About 18 miles to the north-west lies the village of *Pandi*, also noted for its

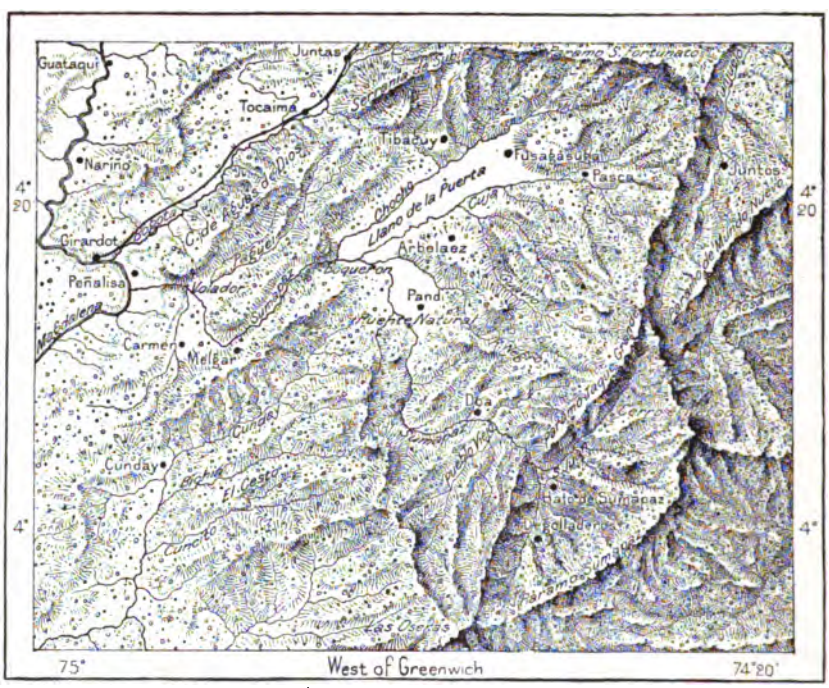
inscribed rocks, and for the natural bridge of *Icononzo*. Below Pandi the Cuja rivulet joins the Suma Paz torrent, which descends from the hills of the same name, and which is navigable for boats from its confluence with the Magdalena to *Melgar*, centre of all the trade in the Suma Paz valley.

Choconta—Zipaquira—Bogota.

The "savanna," that is to say, the old lacustrine basin traversed by the Funza, or upper Bogota, recalls in its local nomenclature all the memories of pre-Columbian history. At the north-west corner lies *Choconta*, one of the

Fig. 68.—Suma Paz Basin.

Scale 1 : 830,000.



strongholds of the old Muyscan kings. Near a side affluent farther south stood the two holy cities of *Guatavita* and *Guasca*, whose lagoons were the receptacles of so many precious offerings to the tutelar gods. *Nemocon*, one of the chief of Muyscan markets, forwarded to the northern regions the produce of its salt-springs, which are still worked by the Colombian Government. In 1889 Nemocon yielded as much as 6,165 tons of salt, valued at £13,000.

Zipaquira, whose very name ("Residence of the Zipa") indicates that it was the "Windsor" of the Muyscan sovereigns, is still a provincial town with some flourishing industries. Thanks to its salt-mines, and to the coal and iron ores of the surrounding mountains, it is fast becoming the busiest manufacturing centre of

Cundinamarca and of the whole of Colombia. Hundreds of millions of cubic yards of salt are contained in the neighbouring rocks, which overlie a slaty sandstone with saline springs, yielding about two-thirds of the salt consumed in the republic; in 1888 over 20,000 tons of salt, valued at £80,000, were derived from this source. Unfortunately this salt, unlike most of that obtained from the Antioquian springs, contains no iodine, so that goître has been developed and rapidly increased amongst certain communities using the Zipaquira article.

Funza, capital of the southern Muyscas at the time of the Conquest, had at that epoch a probable population of 100,000, for Jimenez de Quesada calculated that it contained 20,000 cabins. At present it is an obscure village, although for a time chosen as the capital of the State of Cundinamarca. Before the opening of the railway on which it forms a station midway between Bogota and Facatativa, it had even been abandoned by the main highway, travellers usually alighting at the neighbouring inn of *Cuatro Esquinas*.

Funza stood originally in the middle of the level plain between the Rio Funza and its tributary, the Serrezuela. But in 1538 Quesada chose another site 12 miles to the south-east, beyond the Rio Funza at the foot of the Eastern Cordillera, where was situated the Indian village of *Teusaquillo*. Under the Spanish rule *Bacata* (*Muequeta*), an alternative name for Funza, was transferred to *Santa Fé*, as Quesada had called his new settlement. Hence the expression, *Santa Fé de Bogota*, or simply Bogota, by which the place is now officially known.

No other South American state has selected for its capital a city so far removed from the seaboard, and consequently left more entirely to its own resources. To this circumstance are largely due the peculiar features by which the historic evolution of Colombia is distinguished. Lying in the cold zone at an altitude of 8,680 feet, on a bleak plain growing no trees except the apple and the willow, Bogota rises eastwards on the lower slopes of the Guadalupe (10,580) and Monserrate (10,290) heights, which stand nearly at the same elevation as the neighbouring cordillera. The city is divided into several distinct quarters by two affluents of the Funza, which during the rainy season are often transformed to raging torrents. In the central square stands the statue of the "Liberator," surrounded by the chief public buildings, whence the main thoroughfares radiate in all directions. The "Martyrs' Column" commemorates the fate of about a hundred Colombians, shot by the Spaniards in 1816.

Besides the university, founded in 1867, and already the best institution of the kind in the Andean region north of Chili, Bogota possesses a valuable library of over 50,000 volumes, an observatory founded by Mutis, a fine-arts institute, a picture-gallery, a herbarium, and other collections. The city is expanding considerably, especially westwards and northwards in the direction of *Fontibon*, and of *Chapinero*, a popular holiday resort.

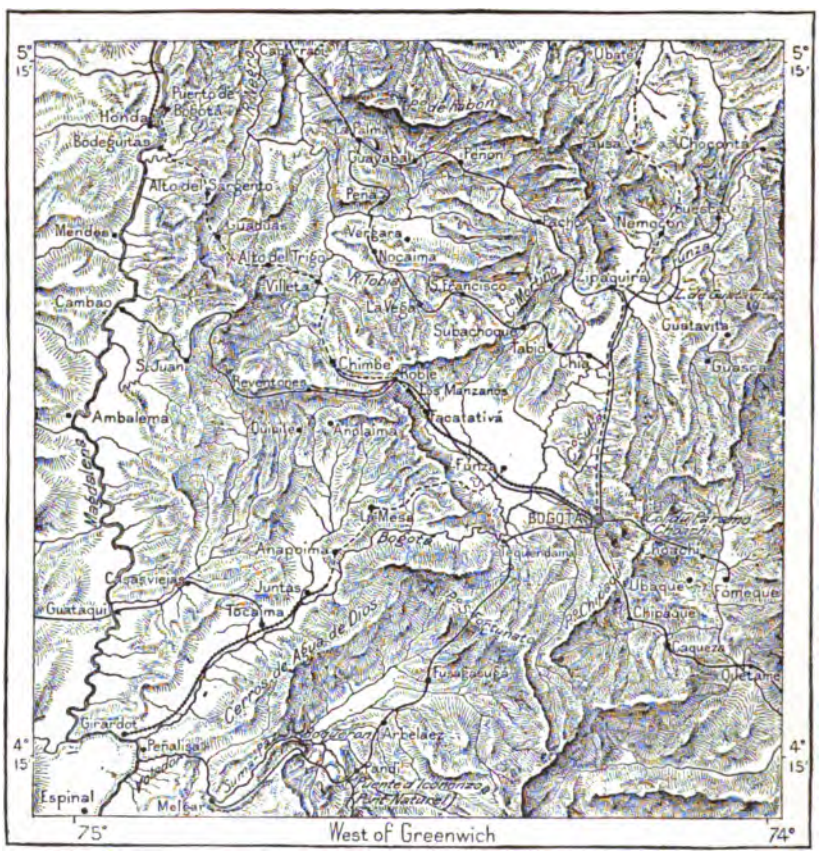
Owing to the absence of easy communications Bogota has developed few industries beyond those needed to supply the more urgent local wants. Before the year 1836 it took three long days' journey to traverse the short but difficult

road north-westwards to *Villeta*, which is still cut off by two rugged passes and two upland valleys from the Magdalena over against Honda.

In 1847 the engineer Poncet undertook the construction of a good road which was to follow the normal north-westerly direction to *Subachoque*, whence a somewhat gently inclined though tortuous route leads to the Magdalena at the Rio Negro confluence, 125 miles from Bogota; thus would have been avoided the ascent

Fig. 69.—Bogota and its Approaches.

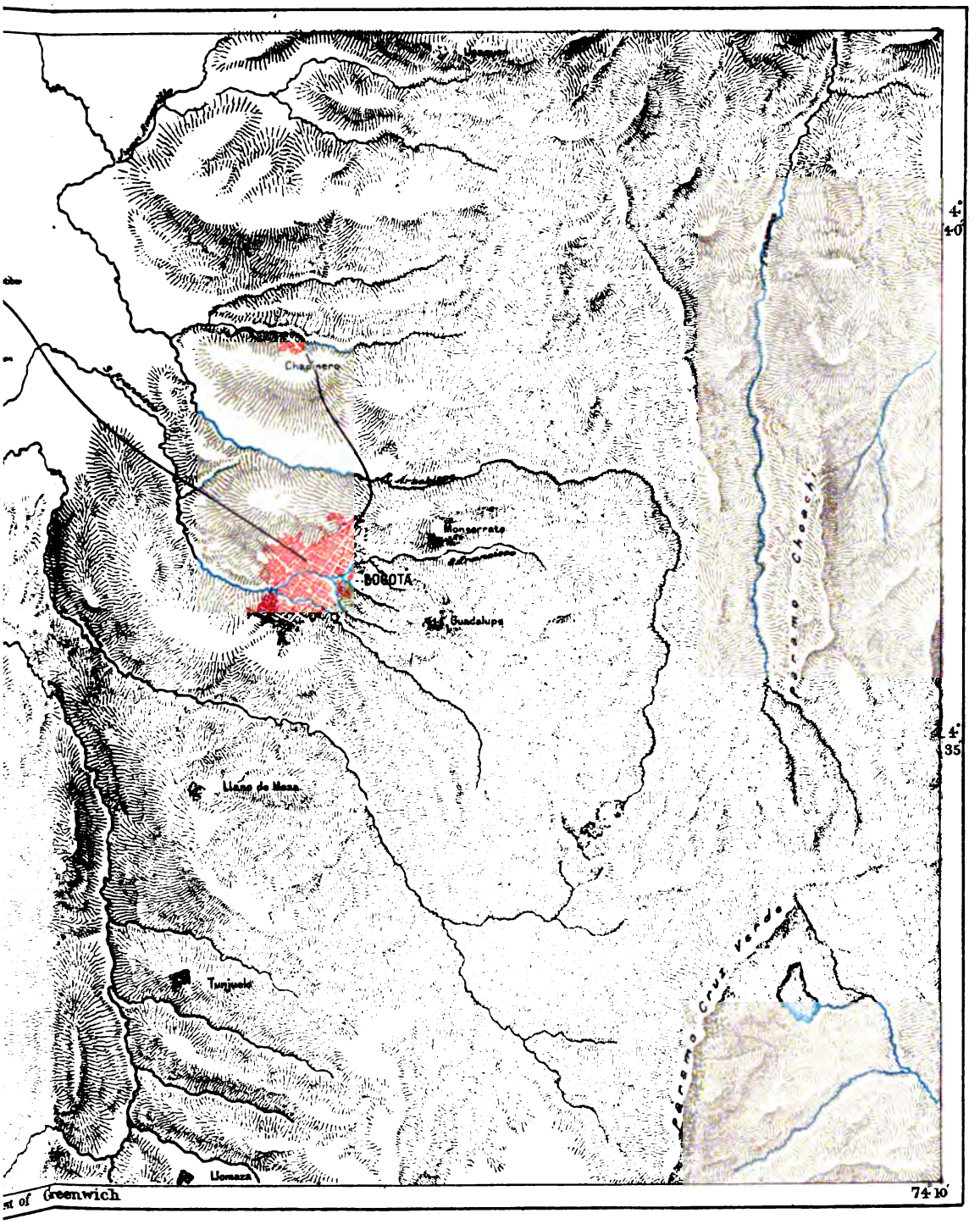
Scale 1 : 1,200,000.



of the steep intervening Cordilleras, as well as the dangerous rapids at Honda. But the ravages of the prevalent marsh fevers, followed by civil wars, arrested the progress of the works, which, however, have recently been resumed. Meanwhile a more direct route was projected from Bogota westwards to the Magdalena at *Cambao*, midway between Ambalema and Honda. But in this direction the only road hitherto opened is a mere bridle-path, while all the other routes become

Engativa
Funza
4° 40'
Santuario
Puente Grande
Fontibon
Cuatro Esquinas
Laguna Batallon
Barro Blanco
Laguna de Fontibon
Chorro
Bosa
4° 35'
Salto
Bogotá
Soacha
Vinculo
Tequendama
Puerta Grande
El Corvado
Páramo Pasquilla
Pantanito
74° 25'
West of

D ITS ENVIRONS.



impracticable after heavy rains. So recently as 1889 the transport of a mule's load weighing about 245 pounds, which usually costs £1 from Honda to Bogota, came to £3, and took from ten to forty and even sixty days, according to the weather.

Hence railway schemes are now more in favour with the public, and three lines have especially been proposed to put the capital of Colombia in communication with the rest of the world. One runs northward through Zipaquira, Chiquinquira, and Velez to the middle Magdalena near the Sogamoso confluence; a second trends north-westwards along Poncet's original route towards the Rio Negro confluence; while the third follows the course of the Funza, south-westwards to the Magdalena at Girardot. The Zipaquira project was begun in 1892, the only other line possessed by Bogota being a short section common to two future routes at present terminating at *Facatativá*, on the edge of the plateau.

This place was one of the old Muysca strongholds, and some of the surrounding rocks are inscribed with characters analogous to those of Pandi. Before the opening of the road and railway Facatativa was a mere group of huts; now it is a thriving station forming an advanced suburb of the capital, on the main route to the Magdalena.

Chipaque—Ubala—Cabuyaro.

Eastwards, Bogota is separated from the rapid but regular slope of the Orinoco only by the relatively easy pass of the Paramo Choachi, which stands 10,400 feet above the sea, but not more than 1,756 above Bogota itself, from which it is distant about 15 miles. The terraces and upland valleys draining to the Orinoco are nearly as densely peopled as the Magdalena slope. Here have sprung up several towns, such as *Chipaque*, *Caqueza*, *Ubaque*, *Choachi*, *Fomeque*, and *Quetama*, on various affluents of the Humadea, and farther north *Junin*, *Gacheta*, *Ubala*, and other large centres of population in the upper Upia basin. But the population decreases in the direction of the llanos, and *San Martin*, *Villavicencio*, *Medina*, and the other settlements founded on the verge of the plains are merely rural stations for fattening the cattle before being driven up to the Bogota plateau.

These marvellously fertile lands have hitherto been little utilised, owing partly to the prevalent fevers, partly to the difficult and even dangerous routes leading from the llanos up to the central plateaux. During the past century there has even been a considerable falling off in the number of the inhabitants, the Indians having been reduced to less than one-third, and whole tribes, such as the Achaguas and the Zeonas, having disappeared altogether. The very site of the ruins of the old city of *San Juan de los Llanos* has been lost, and the present stockbreeders own far fewer herds than were formerly bred about the missionary stations.

Nevertheless, symptoms of a revival are apparent in various districts, as at the *Mambita* and other salt-springs. Cacao and coffee plantations are also encroaching on the scrub and woodlands, and in 1857 the little riverine port of *Cabuyaro* was

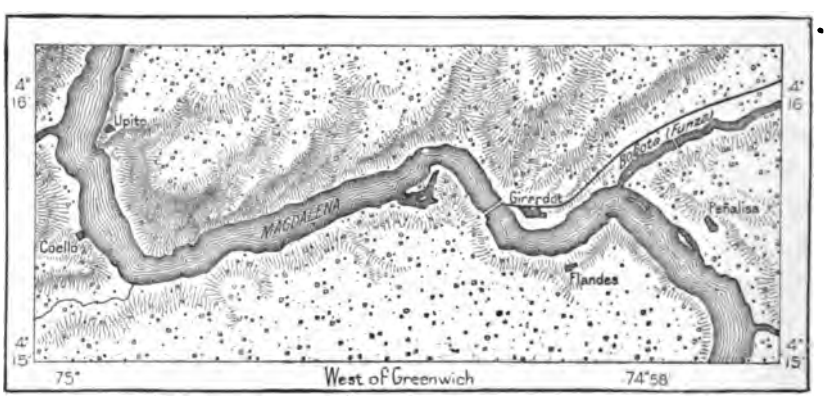
founded on the Humadea, near the Upia confluence. In favourable seasons steamers from the Meta ascend to this point, within 160 miles of Bogota; but they usually get no farther than the island of Orocue, 186 miles below Cabuyaro.

Mesa—Tocaima—Girardot—Ibague.

On the highway from Bogota to the upper Magdalena and Ecuador the first station is the town of *Mesa*, the "Table," so named from a conglomerate terrace 4,100 feet high which commands the deep gorge of the Rio Bogota below the falls. At the foot of the terrace the village of *Anapoima* occupies the arid bed of an old lake near some sulphur-springs east of the Rio Apulo. This torrent descends southwards from the heights of *Anolaima*, a town which, before the Spanish Conquest, lay within the territory of the Panches Indians. The railway, which is to ascend from Girardot up the escarpments of the plateau, stops within three miles of the Apulo confluence; the next section, by which it is to surmount

Fig. 70.—Girardot Bend.

Scale 1 : 48,000.



the Mesa terrace, will be constructed on the ratchet-wheel principle, like that of the Righi.

Tocaima, a station on the same railway below *Juntas*, was till recently much frequented, thanks to its hot sulphur springs; but visitors have greatly fallen off since the appearance of yellow fever in the district. *Agua de Dios*, the most noted spring in the neighbourhood of Tocaima, is reserved for the leprous, for whom the State of Cundinamarca has founded an agricultural settlement and a lazaret supported by a special tax on legacies. In 1890 the village of Agua de Dios was inhabited by 520 patients, each owning a plot 2½ acres in extent, which he either cultivated himself or rented to tenants. The development of the disease, which is not contagious in the Tocaima climate, is said to be nearly always arrested in this district. The high rate of mortality amongst those interned in Agua de Dios is due, not to the leprosy itself, but to their generally feeble con-

STREET VIEW, LA MESA.

stitution. The Tocaima vines yield a grape of exquisite flavour, but useless for making wine, owing to the high temperature of these bottom-lands, which stand at an elevation of little over 1,650 feet.

Girardot, terminal station of the railway on the Magdalena, lies immediately below the two confluences of the Fusagasuga and Bogota. It is a modern place, which has suddenly acquired some importance, thanks to the railway and to an iron bridge, 430 feet long, which spans the mainstream at the Flandes gorge, and which is utilised for most of the traffic between the capital and the province of Tolima.

Ibague, second city in the province, stands at an altitude of 4,270 feet, on a fertile plain encircled by the spurs of the Tolima volcano and traversed by the Rio Combeima, which joins the Magdalena at *Coello*. Eastwards stretch the arid lava-fields, which are separated from the mainstream by the rocky rampart of the volcanic crests of Gualanday. Although Ibague neglects its silver-mines and sulphur-beds, it does a brisk trade as a chief depot between the Cauca and Magdalena valleys. The outlet of this traffic on the latter river is *Guataquisito*, opposite Guataqui, starting point of the route ascending in the direction of Tocaima and La Mesa.

Ambalema—Honda—Mariquita.

Ambalema, one of the chief towns of the department of Tolima, is a modern place, founded in 1786 on the left bank of the Magdalena at the confluence of the Recio. The tobacco formerly grown in this district was regarded as the finest in Colombia, and was exported in large quantities to the Bremen market. But it was attacked by a blight which reduced both the quantity and quality, so that the Tolima plantations were no longer able to compete with those of other regions, such as Java and Sumatra.

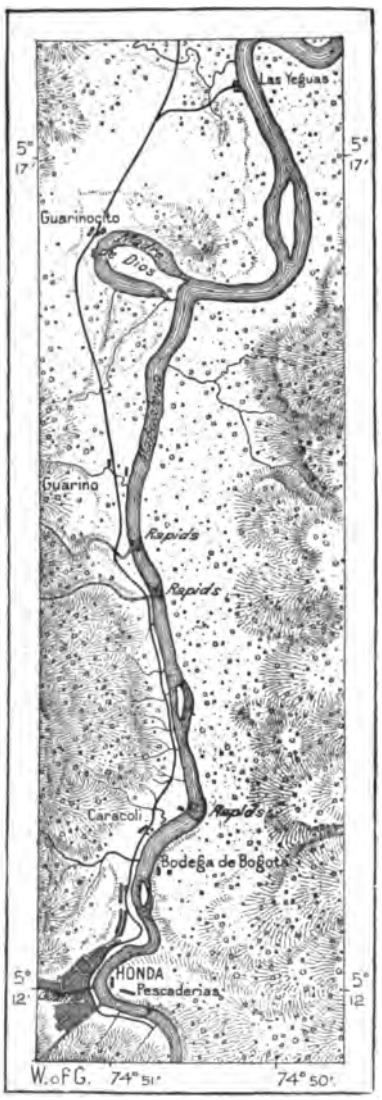
Some 60 miles below Ambalema, and on the same side of the Magdalena, stands the town of *Honda*, so named from the "depth" of the stream above the rapids. Honda, which is one of the historical cities of Colombia, served in colonial times as the general depot for all goods imported from Cartagena by the Magdalena route for Bogota, Popayan, and other inland places. The Guali torrent, which reaches the mainstream above the rapids, and which is crossed by several bridges, divides the town into two quarters—one on the right side, founded by the Conquistadores, but overthrown by the earthquake of 1805; the other on the left side, of recent origin. In the old town the ruined houses occupy as much space as those still standing, and the population has fallen from 20,000 to about 5,000. Nor is there much prospect of a revival, as the so-called Dorada railway, which turns the rapids, has had the natural consequence of shifting the position of the depots. This line, some 12 miles long, receives at the inconvenient port of *Las Yeguas* the goods brought up by steamer, and conveys them to the terminal station of *Arranca-Plumas*, above the rapids. From this place, which lies opposite *Pescaderias*, they are forwarded by pack-animals pending the construction of other lines up the escarpments of the Bogota plateau. The Dorada line itself is also to be continued

northwards to the riverine port of *Conejo*, which is of far more easy access than Las Yeguas.

Mariquita, founded in 1550 in the Guali valley, has now little to show except ruined monuments of the past. The gold- and silver-mines which made it the chief place in the whole district have long been abandoned, while the crumbling remains of sumptuous Spanish dwellings stand out amid the surrounding verdure, side by side with the hovels inhabited by a goitrous community of sambos and other half-breeds. This historical place, where the pioneer Quesada died, and where the renowned botanist Mutis made his collections and planted his groves of cinnamon and other rare exotics, shared the fate of Honda in 1805, when over 10,000 persons were destroyed by the earthquake in both places.

Fig. 71.—Honda and La Dorada Railway.

Scale 1 : 80,000.



The Rio Negro, which joins the Magdalena below the rapids, contains several important places, such as *Villeta* and *Guaduas*, the latter of which was till lately the second largest town in Cundinamarca, and a flourishing station between the capital and the river. Although deprived of much of its trade by the opening of new routes, Guaduas remains one of the most delightful cities in Colombia, being favoured by a mild climate, rich vegetation, and romantic scenery. *Pacho*, near the sources of the Rio Negro, a place well known to orchid collectors, is at present the chief centre of the hardware industry, thanks to the neighbouring iron-mines.

The last village in the department of Tolima on the left bank of the Magdalena bears the fully justified name of *Buena Vista*. It is encircled by magnificent woodlands, and separated from the province of Antioquia by the lovely Rio Miel (Timona), which reaches the Magdalena just below the Negro confluence. *Nare*, on the left bank farther north, was formerly the only port of the province of Antioquia on the Magdalena. Lying above the *Angostura* ("Narrows"), it was a natural depot for the traffic of the Rio Nare, which is navigable for boats as far as *Islitas*, at the confluence of the Nus. But its unhealthy climate, and the selection of another riverine station more favourably situated lower down, hastened the ruin of Nare. In the upper Nare basin are the

two towns of *Rionegro* and *Marinilla*, which are familiar names in the revolutionary annals of the country, and which give their names to the two hostile factions of the Rionegreros ("Reds," or "Liberals"), and Marinillos ("Blues," "Godos," or "Conservatives").

Puerto Berrio—Tunja—Boyaca.

Puerto Berrio, on the left bank of the Magdalena below Nare, dates only from the year 1875, when this site was chosen as the most convenient terminus for the future railway which is to ascend from the river to Medellin, and thence ramify over the Antioquian plateau. The first section, traversing the low-lying malarious riverine district, has already been completed for a distance of 30 miles, at an altitude of 2,620 feet, in the mineral territory watered by the Nus affluent of the Nare, whence the line will be continued over the Quiebra Pass (6,560 feet) north-westwards to the Porcé valley, and thence southwards to Medellin.

The San Bartolomé, which joins the left bank of the Magdalena 16 miles below Puerto Berrio, is scarcely utilised for navigation, and contains no large centres of population in its basin, although its farthest headwaters take their rise in auriferous districts. Farther down the Magdalena receives, on its right bank, the Carare, which also traverses an almost uninhabited region, although its valley presents the shortest of all the projected routes between Bogota and the capital. The Minero (upper Carare) waters a hilly country abounding in minerals and precious stones. Here lies the village of *Muso*, formerly a large and flourishing city, which yields the finest emeralds in the world. The open quarry where the stones are found has been worked with various success since the year 1558, that is, after the destruction of the Muso Indians, who had ruined the first Spanish settlement of *Tudela*, and who, after a struggle of twenty years, were at last exterminated by the aid of dogs trained to hunt down the natives. At present the Government, which owns the mines, farms them to a French syndicate for a yearly sum of £2,250; the net profits of the speculators, although subject to the whims of fashion, are estimated to average about £10,000 a year. The mode of working is by open trenches, the debris being washed down the river by water collected in a reservoir built above the level of the mine. About 300 natives are employed at the mines, which lie some 80 miles north by west of Bogota, in a wild country with almost impassable roads. The rough stones are mostly sent to Paris to be cut and mounted.*

Some 40 miles below the Carare the Magdalena is joined on the same side by the Rio Opon, whose valley was followed in 1536 by Jimenez de Quesada on his expedition to the conquest of the Muysca plateau. Before that event the Muyscans forwarded their cotton fabrics and the produce of their salt-springs by the Opon, but now all traffic has ceased, despite the opening of a new road from *Zapatoca* to *Barranca Bermeja* ("Red Ravine"), on the Magdalena.

Tunja, on the site of *Hunsa*, former residence of the king of the northern

* Report of the British Minister at Bogota, 1892.

Muyscas, stands at an altitude of 9,160 feet, near the sources of the Sogamoso. Numerous churches and other buildings attest the former prosperity of this place, which, although chosen as capital of the State of Boyaca, is a decayed town, outstripped in population and trade by several other cities in the province. Its neighbour, *Ramiriqui*, is inhabited by a community of industrious Indians, who weave cotton and woollen stuffs, and occupy themselves with stock-breeding.

The province takes its name from the village of *Boyaca*, a little to the south-east of Tunja, where Bolivar gained the famous battle which secured the independence of Colombia (1819). The little bridge still exists which was so hotly contested, and near which are some noteworthy rock inscriptions. Here the Cordillera is crossed by some easy passes leading down to *Turmequé*, *Umbita*, and *Guateque*, which occupy the first cultivated terraces on the slopes draining to the Orinoco.

Duitama—Sogamoso—Soata.

Below Tunja the tortuous Rio Sogamoso flows at the foot of a terrace, on which stands the ancient town of *Duitama*, formerly inhabited by a Muysca tribe, which under the powerful cacique Tundama offered a valiant resistance to the Spaniards. *Santa Rosa de Viterbo*, on the same terrace, is noted for its meteorite, weighing 1,540 pounds, which was discovered in 1810 on a neighbouring eminence, and removed to a clump of trees in the middle of the square. But its extra-terrestrial origin, vouched for by Boussingault and Rivero, does not appear to be quite beyond suspicion, for similar ferruginous blocks are said to occur embedded in the neighbouring rocks.

Sogamoso (Suamoz), on the banks of the river to which it gives its name, was, like Tunja, one of the historical cities of the Muysca empire. About a mile to the south-east is shown the site of *Iraca*, where resided the *sogamuxi*, or high priest of the nation, and where stood the richest temple of the land, a vast wooded structure covered with plates of gold. During the sack of the town the Spaniards inadvertently set fire to the building, which continued to burn for several days, five years according to the local legend.

Although visited by pilgrims from all quarters with their offerings of gold and precious stones, Sogamoso is a flourishing centre of the cattle trade, exceeding the capital in population. The surrounding plains, often under water, are little suited for tillage, but they serve to fatten numerous herds imported from the llanos of Casanare; the local breed of horses is also highly esteemed.

Soata, some 60 miles farther north, stands on a well-cultivated terrace (6,710 feet), dominating the west side of the deep gorge of the Sogamoso. It is an important agricultural and trading centre, surrounded by fertile plains yielding abundant crops of sugar, wheat, and other produce of the hot and temperate zones; even the date-palm, rare in Colombia, here arrives at maturity.

North of Sogamoso the chief places in the valleys of the Eastern Cordillera are *Chita* and *Cocui*, the former south, the latter north of the main range, but both within the cold zone at the respective altitudes of 9,765 and 9,045 feet. Chita

LANDING STAGE ON THE MAGDALENA, NEAR THE SOGAMOSO CONFLUENCE.

enjoys the benefit of some extremely rich saline hot springs (122° Fahr.) in the Casanare basin, which are utilised by the neighbouring Tunebo Indians for various maladies. The Cocui district abounds in coal, iron, copper, argentiferous lead,

Fig 72.—Boyaca Battlefield.

cinnabar and salt, resources hitherto untouched, owing to the absence of practicable roads.

West of the Cocui the Sogamoso bends round to pierce the parallel ridges of the Cordilleras through a series of deep gorges in a romantic region where all the settlements are situated at some distance from the river, on the elevated terraces

or in the upland valleys. Such are *Onzaga* and *Mogotes*, the latter about 3 miles from the *Hoyo de los Pájaros* ("Birds' Hole"), a chasm 600 feet deep and only 150 in circumference, in which hover flocks of the same species of "devil-bird" that frequents the Caripe caves.

San Andres, noted for its schools, stands at an elevation of over 6,500 feet, in a mountain valley near Lake Ortices, about midway between the industrious town of *Malaga* in the south-east and the flourishing city of *Bucaramanga* in the Lebrija valley. South of this place flows the Suarez (Saravita), which joins the Sogamoso in one of the most rugged regions of Colombia, where the river gorges, with their terraces, overhanging cliffs, and steep escarpments, resemble the cañons of Colorado. Between *Sube* and *Los Santos*, in this district, the Sogamoso is spanned by the first iron suspension-bridge erected in Colombia.

Ubate—Leiva—Socorro—Zapatoca.

Lake Fuquene, source of the Suarez, lies within the central province of Cundinamarca, where is also situated the ancient Muysca fortress of *Ubaté*. North of the lake, at the northern verge of the old lacustrine basin, stands *Chiquinquira* ("City of Fogs"), which, although of Spanish foundation, still bears a Muysca name. It is a noted place of pilgrimage, whose "Miraculous Virgin" is said in some years to attract as many as 60,000 devotees. Thanks to this continual concourse, Chiquinquira has grown wealthy, and is at present the largest city in the province of Boyaca.

Some six miles north of Chiquinquira, near the village of *Saboya*, is seen the most remarkable rock inscription in Colombia. The surface is covered with painted characters, most of which are unfortunately overgrown by lichens. The inscription, which has not yet been deciphered, is supposed by the natives to contain directions regarding certain hidden treasures, while Ancizar and other antiquaries infer from the representation of the frog, symbol of "copious waters," that it refers to the deluge caused by the overflow of Lake Fuquene into the deep gorge apparently indicated by the paintings.

Leiva, standing east of Chiquinquira at an altitude of 6,500 feet, near the site of an old Muysca city, possesses copper-, silver-, and sulphur-mines, and has become a centre of the wine and olive industries. *Moniquira*, north-west of Leiva, also lies in a mineral district, and its copper-mines are at present the most productive in Colombia.

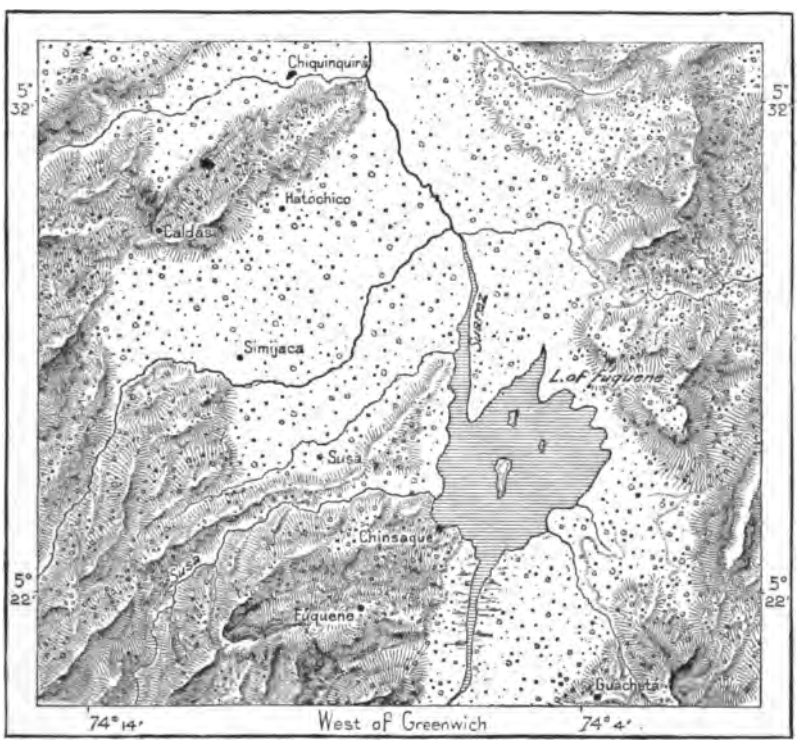
Immediately below the confluence of the Rio Moniquira the Suarez has the province of Santander on its left bank. Above the confluence it is spanned by the *Puente Nacional* ("National," formerly "Royal," Bridge), which gives its name to a large settlement marking the site of an old fair field frequented by the Chibcha, Guanes, and Agataes Indians. From this point the route ascends westwards to the pleasant little town of *Jesus Maria*, and northwards to the city of Velez (7,190 feet), founded in 1539 in an important strategical position near the divide between the upper Sogamoso basin and the Carare and Opon river

valleys. Despite the difficult approaches Velez has prospered, and is now scarcely inferior in size to the capital of the province. Near *La Paz*, 12 miles farther north, occurs the curious *Hoyo del Aire* ("Air-Hole"), a pit 390 feet deep and over half a mile round, which appears to have been formed by the surface strata sinking into underground chasms.

Socorro, capital of Santander, lies at a height of 4,120 feet, on a sloping terrace rising in steep escarpments above the Suarez, which flows 2,000 feet below. Socorro, which was removed in 1681 to its present unhealthy position

Fig. 73.—Chiquinquira and Lake of Fuquene.

Scale 1 : 280,000.



from the site of the old Indian settlement of *Guame*, is one of the chief cities of the republic. Here began the revolutionary movement in 1781, when Maria-Antonia Vargas broke the royal escutcheon, tore down the edict proclaiming fresh taxes, and rallied to the standard of revolt the first band of *comuneros*, forgotten precursors of the Bolivars, Sucres, Santanders, and other heroes of the War of Independence.

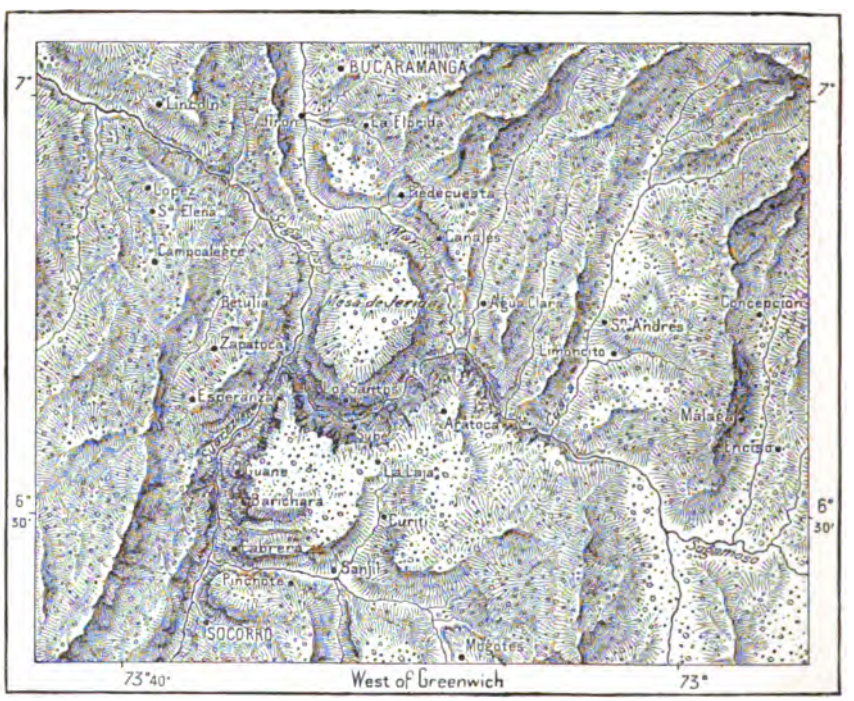
South-west of Socorro a less elevated terrace is occupied by *Simacota*, which was long famous for its so-called "volcano," the smoke of which, rising above a neighbouring gorge, is caused by a mass of coal and pyrites in a state of combustion. Farther north the Suarez is joined below Socorro by the Rio Sanjil,

which takes its name from the industrial town of *Sanjil* (*San Gil*), where are manufactured coarse fabrics, hammocks, and agricultural implements, besides sugar and brandy in sufficient quantities to meet the local demand. Some 2,620 feet above Sanjil stands *Aratoca*, while the terrace enclosed by the beds of the Suarez and Sogamoso is occupied by *Barichara*, a place of pilgrimage, which had its origin in 1751 in a shapeless block mistaken by a shepherd of the district for an image of the Virgin. Farther north follows *Zapatoca*, perched on a platform 4,120 feet above a suspension bridge which here crosses the Sogamoso.

Zapatoca and neighbouring villages are the last groups of habitations in the

Fig. 74.—Socorro, Bucaramanga and Sogamoso Gorges.

Scale 1 : 1,000,000.



18 Miles.

Sogamoso valley, for here begin the great forests where nothing is to be seen, except at long intervals a solitary woodman's or boatman's hut. The gloomy solitudes of the lower Sogamoso merge in those of the Rio Magdalena, which is here fringed by swamps, lagoons, false rivers, and backwaters.

Some 30 miles below the Sogamoso confluence the right bank of the Magdalena is occupied by the little riverine port of *Paturia*, which was founded in 1867, and which still awaits the construction of the projected railway to become a busy centre of traffic. At this point the Magdalena communicates by a lateral channel with the Rio Lebrija and a system of inland lagoons affording navigable

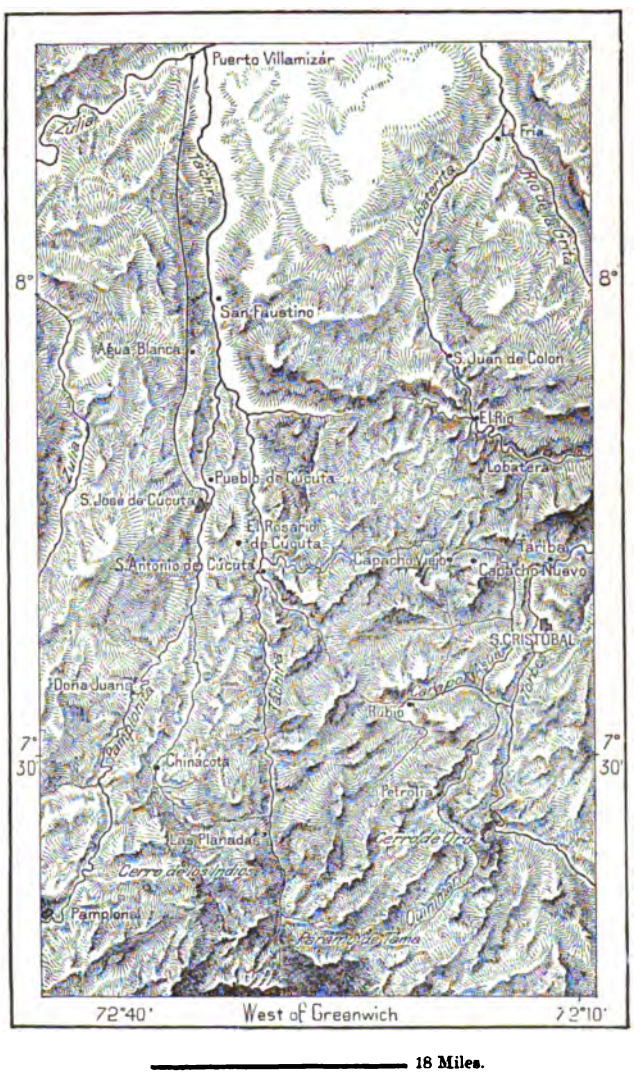
waterway as far as *Puerto Botijas* (*Estacion, Santander*), where the merchants of Bucaramanga and neighbouring towns have their depots.

Jiron—Bucaramanga—Cucuta —Ocaña.

Jiron (*Giron*), the oldest settlement in this district, lies at an elevation of 1,850 feet on the Rio de Oro, tributary of the Lebrija. Thanks to its gold-mines, Jiron is a busy place, though somewhat eclipsed by the neighbouring *Bucaramanga*, which, although less accessible, enjoys a more healthy climate at an altitude of over 3,000 feet above the sea. Nevertheless, Bucaramanga, like its neighbours, Jiron and *Piedecuesta*, has lost some of the sources of its prosperity. Its gold-mines are no longer worked, and it has ceased to export tobacco, cacao, and straw hats, while the cinchona of the surrounding forests is now little esteemed.

Fig. 75.—Cucuta District.

Scale 1 : 900,000.



Bucaramanga lies within the Magdalena basin, near the waterparting towards the Maracaibo and Orinoco hydrographic systems. On the Orinoco slope the only place that ranks as a town is *Concepcion*, near which are some hot springs.

The upper Lebrija basin is separated by the Mesa Juan Rodriguez range from the upland valleys draining to the Venezuelan rivers, Zulia and Catatumbo. *Pamplona*, the most elevated place on this slope, stands at an altitude of 7,550 feet in an old lacustrine basin, source of the Rio Pamplonita. Although less animated than the other

towns of Santander, Pamplona, an old ecclesiastical foundation dating from the year 1549, possesses some industrial specialties, such as brewing and match-making.

Beyond this place the route follows the windings of the Pamplonita from terrace to terrace through one of the most romantic valleys of the Andes, and passes below the village of *Chinacota*, where the ferocious Alfinger met his fate, *San José de Cucuta*, or simply *Cucuta*, on the left bank of the Pamplonita, lies already in the hot zone at an altitude of not more than 960 feet above the sea. The coffee plantations, to which Cucuta owes its prosperity, lie higher up on the slopes of the mountains; but the cacao, one of the best in the world, is grown in the immediate vicinity. In 1875 Cucuta was visited by an earthquake, with a combined vertical and vortical movement, which left not a single house standing. All walls over 2 feet high were levelled with the ground, and at least 2,000 persons were crushed beneath the ruins. The two neighbouring towns of *Rosario* and *San Antonio* were also overthrown, and the seismic waves, radiating from this centre, were felt with decreasing violence as far as Pamplona, Merida, and Ocaña. According to Sievers the shocks were propagated only under sedimentary rocks, the crystalline formations of the Cordillera remaining almost undisturbed.

But Cucuta soon recovered its prosperity, and at present this district is relatively the most industrious in Colombia. It contains over 80,000 inhabitants, and yields as much as 50,000 tons of coffee, valued at about £250,000. This rapid recovery was due to the railway which terminates at *Puerto-Villamizar* (*San Buenaventura* or *San Bueno*), on the Rio Zulia, although the foreign trade is carried on through the Venezuelan port of Maracaibo. Hence the Colombian engineers have often proposed the construction of roads or railways across the Eastern Cordillera, to connect the Cucuta district and its rich plantations with the banks of the Magdalena, and thus divert the traffic from Venezuela to Colombian territory.

On the other hand, all the Venezuelan towns of the western Sierra de Merida gravitate towards Cucuta, as do also the three Colombian towns of *Pueblo*, *Rosario*, and *San Antonio*. Rosario, lying to the south-east, near the Rio Tachira, formerly held the first rank, and here was held, in 1821, the general Congress where was framed the constitution of the three united republics of Venezuela, New Grenada, and Ecuador.

Ocaña, standing at an altitude of 3,820 feet, near the sources of the Rio Catatumbo, is an old place, founded in 1572 in the territory of the Carates Indians. Formerly a state capital, and often proposed as the metropolis of the Colombian Confederacy, it enjoys special advantages in the fertility of the surrounding plains lying within the temperate zone, midway between the hot coastlands and the cold regions of the plateau, with easy communications in one direction towards Lake Maracaibo and Venezuela through the Rio Catatumbo, in another to the Magdalena basin, over a much-frequented pass 6,000 feet high. In this basin the riverine ports of Ocaña are *Puerto Nacional* and *La Gloria*, both on the right bank of the Magdalena.

GENERAL VIEW OF OCAÑA.

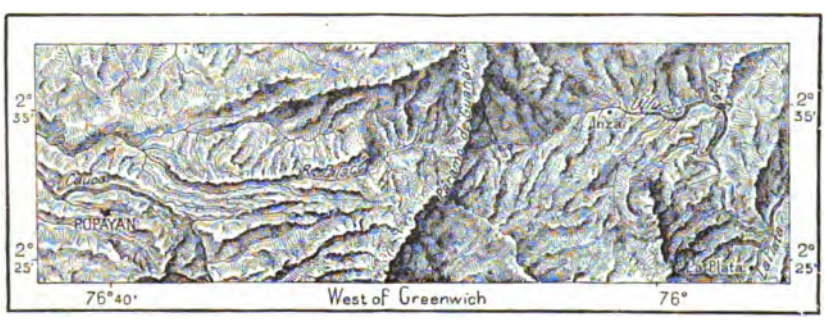
Popayan—Santander—Palmira—Manizales—Pacora.

Near the source of the Cauca, or western Magdalena, stands the famous city of *Popayan*, the "learned," the "noble," the birthplace of more illustrious citizens than any other place in the republic. Popayan, capital of the province of Cauca, presents from a distance an imposing view, its houses, domes, and towers standing on the gently inclined slope of a cultivated tract, traversed by a copious stream which falls in a series of cascades down to the Cauca. Southwards is developed an amphitheatre of hills, crowned by the superb cones of Sotara and Puracé.

Popayan lies within the temperate zone at an altitude of nearly 5,900 feet, with a mean temperature of from 62° to 64° Fahr. The old Indian settlement of the cacique Payan occupied a part of the ground where the followers of Belalcazar founded the Spanish town in 1536. Under the colonial rule it became a thriving colony, thanks to its gold-mines and various privileges; but after the

Fig. 76.—Popayan and Guanacas Pass.

Scale 1 : 900,000.



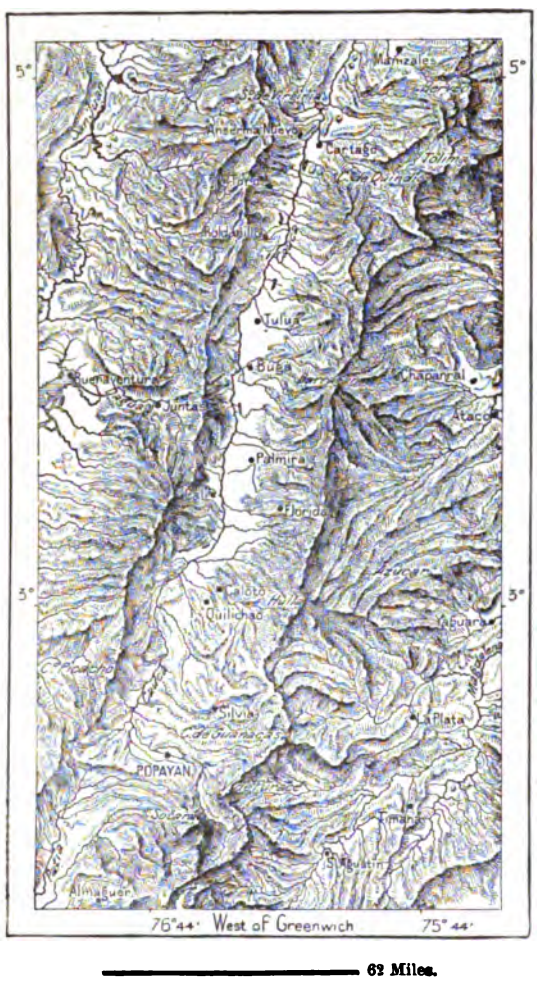
political emancipation of Colombia it suffered more from the civil wars than any other city in the republic, the aristocratic character of its leading families making it the chief centre of conservative interests. Its progress was also arrested by earthquakes, especially that of 1827, and the local industries are now reduced to the production of coarse woollen fabrics.

Popayan has the advantage of being situated on the natural highway leading from Quito to Bogota; but it still lacks easy communication with the Pacific, either by the Patia valley or, better still, by a road leading across the Cordillera down to the Rio Micai. The Pitayo hills, north-east of Popayan, formerly abounded in quinquina-trees, and according to Stübel and Blake White, the air of the district contains an extraordinary proportion of ozone.

Some 60 miles below Popayan the picturesque town of *Santander* stands on the site of the old Indian settlement of *Quilichao*, between the Cauca and the Quindio range. Beyond it follows *Cali*, which is at present the largest place in the province, and which has long outstripped the capital, thanks to its better

communications with the Pacific, from which it is distant in a straight line scarcely more than 50 miles. Standing on the first slopes of the Western Cordillera at an altitude of about 3,400 feet, Cali is well watered by the streams descending the slopes of the mountains to the west bank of the Cauca; every house has its garden and clump of trees, while the surrounding district is covered with magnificent tropical plantations. Founded in 1536, Cali serves as the outlet for all the produce of the Cauca valley to Buenaventura on the Pacific.

Fig. 77.—Upper Cauca Valley.
Scale 1 : 3,000,000.



Palmira, the second city in the province for trade and population, lies a little below Cali, near the right bank of the Cauca; it dates only from 1794, and owes its prosperity to stock-breeding and its tobacco industry. On the same side of the river follow *Buga*, *Tulua*, and *Cartago*, the northern metropolis of the Cauca valley. Cartago lies in an agricultural district abounding in the produce of the tropical and temperate zones, and has the further advantage of standing at the converging point of two important trade routes, one of which serves as the chief outlet for the products of north Tolima and Cundinamarca towards the Cauca basin. Cartago was originally founded in 1540, some 15 miles farther north on the Otun, an eastern affluent of the Cauca, and the old town, renamed *Pereira*, has since been re-settled by colonists from Antioquia.

Manizales, on a terrace of the Quindio range east of the Cauca, has increased more rapidly than any other place in the republic since its foundation in 1848. Its prosperity is due, not so much to its gold-mines or its plantations, as to its rich grazing-grounds, and to its position at the junction of two important routes crossing the central range. Thanks to these advantages, Manizales has become the commercial centre for the southern division of Antioquia; despite the earthquakes of 1875 and 1878 it has never ceased to increase in wealth

and population, and is at present the chief outlet for the cacao of the upper Cauca basin.

Northwards follow *Neira*, *Araazazu* and *Filadelfia*, both recent foundations, and *Salamina*, facing *Supia* and the mining town of *Marmato* on the opposite (west) side of the Cauca. The numerous mines of gold, silver, and other metals occurring in this district have long been known, and some of them were even worked by the Indians before the Conquest. The Cauca is spanned by a suspension bridge at the foot of the Marmato heights, which rise 2,230 feet above the river.

Pacora, north of Salamina, recalls the Paucuera Indians exterminated by the Spaniards. *Sonson* stands at an elevation of 8,285 feet, on the river of like name, which here develops the Aures falls, where the stream is precipitated from a great height over three successive cascades. Thanks to its rich pastures, Sonson, although founded since the War of Independence, already rivals Manizales in trade and population.

Antioquia—Medellin—Santa Rosa.

Farther down follow numerous mining towns, such as *Fredonia*, *Sabanetas*, *Titiribi*, and *Amaga*. Here the eastern slope of the Cauca valley, lying nearest to Medellin, capital of the department, is by far the more densely peopled, although *Antioquia*, which gives its name to the whole region, is situated on the west side on a terrace 1,880 feet high, at the foot of which flows the Rio Tonusco. Like so many other Spanish settlements, Antioquia no longer stands on its original site in the valley of the Frontino affluent of the Atrato, where it was founded in 1541.

Below Antioquia the hot malarious banks of the Cauca remain almost uninhabited, the movement of the population having been deflected farther east to the upland valleys of the Porcé and Nechi, which, if of difficult access, at least enjoy a bracing climate. Here *Medellin*, named from the Medellin of Spanish Estremadura, has long outstripped Antioquia, and at present ranks as the second city of the republic. It lies in the pleasant valley of Aborra, which sends its running waters through the Rios Porcé and Nechi down to the Cauca; but, although discovered in 1541, no settlement was made in this district till the foundation of *Candelaria* in 1674, which remained little more than a group of farmsteads down to the close of the War of Independence. But since then rapid progress has been made by Medellin, as it is now called, which, standing at an altitude of 4,860 feet, lies within the temperate zone, with a climate in which the enterprising inhabitants retain all their characteristic energy.

Medellin is an active centre of the gold-mining industry, and specie to the value of over £1,000,000 was issued by the local mint between the years 1867 and 1888. In 1890 the capital invested in this industry by its citizens was estimated at £3,000,000, and much vigour is displayed in working the gold- and silver-mines in the district and farther east along the unfinished line of railway

running north to the Magdalena. By this route are forwarded the gold and silver ingots destined for England, where reside the chief directors and capitalists of the Antioquian mining region. A portion of the precious metals is also utilised on

Fig. 78.—Goldfields of the Department of Antioquia.

Scale 1 : 2,300,000.

the spot by the native jewellers. Medellin is a university city, with technical schools and some valuable private collections.

The surrounding district presents the rare spectacle in Colombia of real carriage roads, radiating in various directions up and down the Porcé valley and north-westwards to *Ana*, on the road to Antioquia. Several places follow southwards as far as the Alto de San Miguel at the head of the valley; amongst them are

Itagüi and *Envigado*, the latter noted for its exceptionally high birth-rate; families of 20 or even 25 children are by no means rare, and one of the founders of the settlement, who died at the age of 93 in 1870, left behind him as many as 700 direct descendants in the district.

On the northern slopes the chief centres of culture are *Copacabana*, *Jirardota*, and *Barbosa*, future stations of the projected main trunk line. *Santa Rosa de los Osos*, a mining station in the Porcé valley north-west of Barbosa, lies in an extremely rugged country everywhere surrounded by deep gorges, with a relatively cold normal temperature of 58° Fahr., but so healthy that, according to the local saying, "Nobody dies except of old age or by his own hand." In 1880 no physician had yet ventured to settle in the place, although it had at that time a population of 10,000, chiefly miners and gold-washers.

North of Santa Rosa the population falls rapidly with the fall of the land. In the mining regions the Antioqueños, accustomed to the bracing air of the uplands, avoid the moist valleys and lowlands, and settle almost exclusively on the higher grounds. Thus *Carolina*, near the magnificent falls of the Rio Guadalupe, *Angostura*, *Yarumal*, *Anori*, *Amalfi*, all stand at altitudes exceeding 4,750 feet, and are all thriving places, whereas *Remedios*, in the basin of the Ite affluent of the Magdalena, was soon abandoned after the exhaustion of the local gold-mines. Even *Zaragoza de las Palmas*, capital of all the low-lying country below the Porcé-Nechi confluence, remains an obscure village, despite the immense extent of its district, and the advantage of a navigable waterway on which steamers already ply regularly. Still smaller places are *Nechi* and *Santa Lucia*, at the confluence of the Nechi with the Cauca, where begins the marshy region of labyrinthine channels and backwaters forming the inland delta of the Magdalena, Cauca, San Jorge, and Cesar rivers.

Mompos—Carmen.

Till recently the capital of this half-submerged region was *Mompos*, on the left bank of the Magdalena, one of the oldest settlements in Colombia, having been founded by Alonso de Heredia in 1539. But after being swept away by the floods of 1762, and again almost ruined by the erratic character of the mainstream, it was threatened with final extinction in 1868, when the Magdalena shifted its channel westwards to the Loba branch.

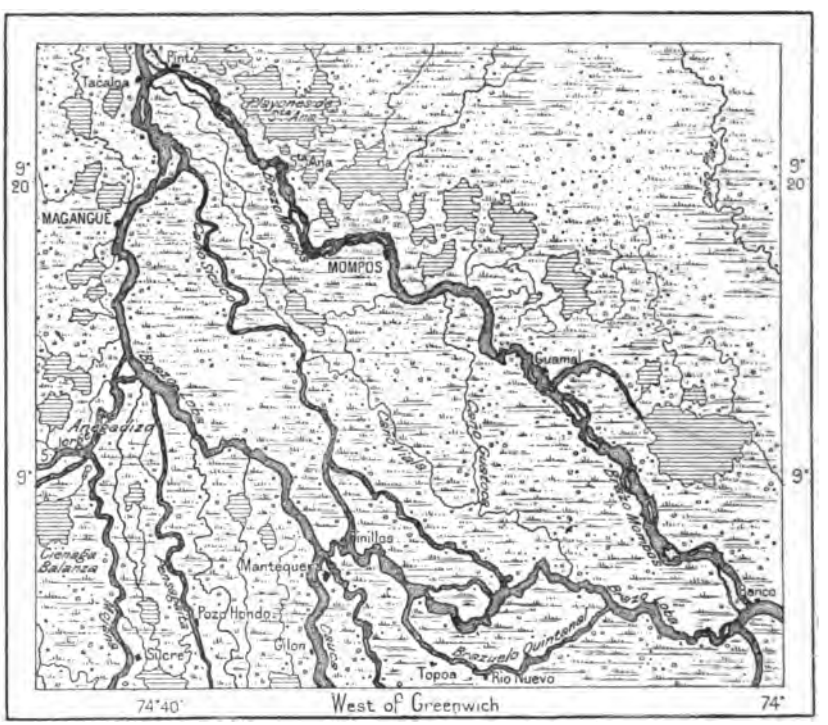
Formerly Mompos was the chief riverine port of the main artery between Honda and its mouth. At the annual fair held in February the produce of the uplands was exchanged for the merchandise imported from the coast, the transactions often exceeding £180,000 or £200,000 in value. In the hope of recovering this flourishing trade it is proposed to again divert the stream eastwards and reopen the Mompos channel. Meanwhile, the shifting of the fluvial current has conferred some importance on *Guamal*, at the junction of the Loba branch with the Cauca; but the change has been even more beneficial to *Magangué*, on the left bank of the united streams below the San Jorge confluence.

Magangué is at present the chief station between the inland and the outer deltas, and its fairs are much frequented by the local traders. But Magangué is constantly being threatened with the fate of Mompos, especially during the periodical floods.

Tacaloa, converging point of all these ramifications, never acquired any economic importance, although the vast plain extending westwards to the Gulf of Morosquillo has contributed not a little to the material prosperity of the republic. On this plain, nearly midway between the river and the gulf, stands the agricultural town of *Corozal*, and the surrounding savannas afford pasturage for over 500,000

Fig. 79.—Ramifications of Mompos.

Scale 1 : 900,000.



head of cattle, enough for the local demand and for a brisk export trade with Panama, Venezuela, and the West Indies.

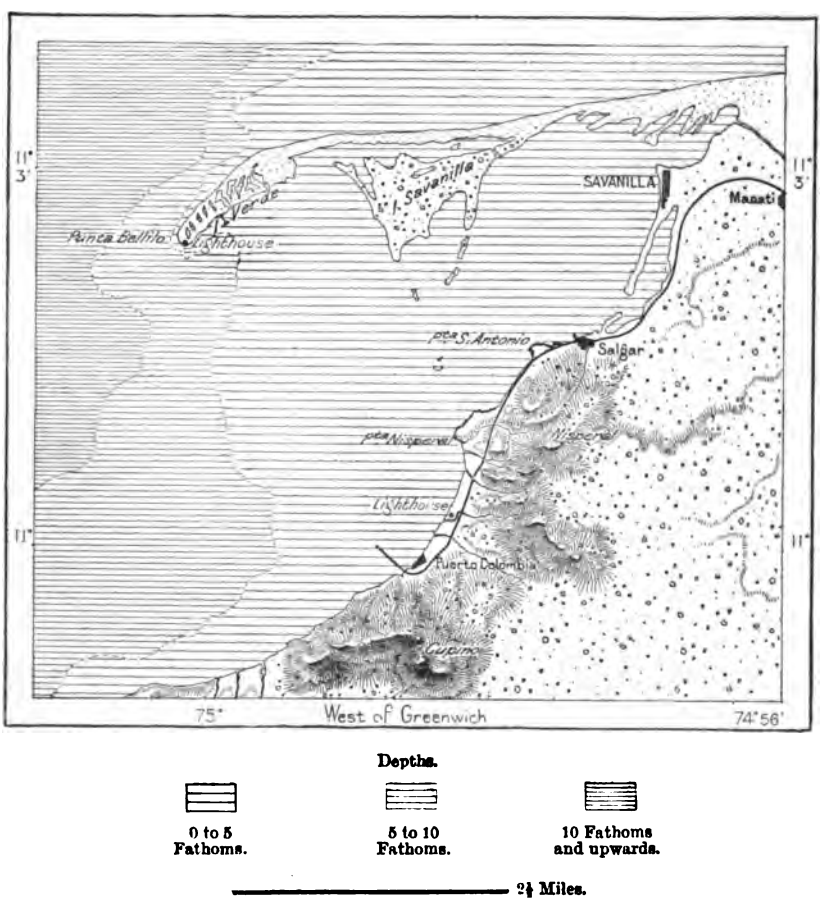
Carmen, north of Corozal, grows an excellent tobacco, and at *Chinu* (Sinu), south of the same place, near the divide between the San Jorge and Sinu basins, the conquistador Pedro de Heredia discovered those Indian graves which yielded the richest booty ever obtained in the New World. Each of his 150 followers is said to have received as his share plunder to the value of 6,000 ducats, about £2,700. Yet all subsequent efforts have proved vain to re-discover the gold-mines whence were obtained these prodigious treasures.

Barranquilla—Savanilla—Santa Marta.

Below Tacaloa follow a few small settlements, such as *Tenerife* on the right, and *Calamar* on the left bank of the Magdalena, the latter at the point where the Dique canal branches off to an inlet on the coast a little south of Cartagena. Farther on, near the mouth of the mainstream, are *Remolino* on the right, and on the left side *Sabana Grande* and *Soledad*, just above Colombia's chief seaport, *Barranquilla*. This place stretches two or three miles along a lateral creek, which

Fig. 80.—Roadstead and Harbours of Savanilla.

Scale 1 : 110,000.



flows through a poor alluvial soil thinly covering recently upheaved coralline reefs. The town, with its low whitewashed houses and grated windows, laid out on the draught-board pattern, presents a somewhat uninviting aspect, although its shops and warehouses are well stocked with European goods.

Founded in 1629, Barranquilla remained a mere group of cabins till the introduction of steam navigation on the Magdalena towards the middle of the present century. Since then it has developed into an important seaport and

marine station, with ship-building yards, repairing docks, and a whole flotilla of river steamers. But sea-going vessels are excluded by the dangerous bar, and compelled to ride at anchor some 12 miles to the north-west in Savanilla Bay, which, however, is connected with Barranquilla by a railway and by some shallow channels soon to be replaced by a navigable marine canal. Through the passages ramifying eastwards in the direction of Cienaga, this flourishing emporium also commands the trade of Santa Marta with the Magdalena, and with all the inland cities, and has thus become the converging point of two-thirds of the whole traffic of the republic.

Savanilla, at the head of the deep bay to which it gives its name, is accessible only to the lightest craft; but the railway connecting it with Barranquilla has been continued along the shore south-eastwards through *Salgar* to *Puerto Columbia*, at the foot of the steep and rocky coast range. On the north side the bay is skirted by a chain of islets and sandbanks, where it was hoped that better anchorage might be obtained. A branch line had already been constructed to *Puerto Belillo* at the extremity of these half-submerged lands; but the sheltering islet of *Isla Verde* ("Green Isle") was swept away during a fierce storm in 1887.

Santa Marta (*Santamarta*) may also be regarded as belonging to the region of the Magdalena delta, although actually lying at the north-west extremity of the snowy range to which it gives its name. This is the oldest Spanish settlement in Colombia, having been founded by Rodrigo Bastidas in 1525; here, also, was organised the expedition which was led by Jimenez de Quesada, a few years later, to the conquest of the Muysca empire. Communicating with the Magdalena by the great *Cienaga* ("Lagoon"), and by several passages separated from the sea by the Salamanca spit, Santa Marta remained down to the present century the chief Colombian seaport in the Caribbean waters. But since the opening of the Savanilla railway the "Samarios," as the inhabitants are called, have lost nearly all their trade. In 1889 the whole of the foreign exchanges had fallen to about £8,000. But they hope to recover the ascendency by constructing a railway to the Magdalena at the Cerro San Antonio nearly opposite the Dique de Calamar, or even much farther up, at *Banco*, on the Rio Cesar confluence. But in 1893 this line had only reached the Rio Frio affluent of the Cienaga. Santa Marta also suffers from an unhealthy and oppressively hot climate, with a mean temperature of 83° or 84° Fahr.

Mamatoco, on the Manzanares height, and various other settlements on the encircling slopes, serve as health resorts, although the surrounding mountains still remain almost an unknown region. *San Juan de Cordoba*, better known by the name of *Cienaga*, from the neighbouring lagoon, has already outstripped Santa Marta in population and commercial activity.

Southwards, the highway running along the foot of the sierra in the direction of the Rio Cesar valley has recently attracted numerous settlers. Here have sprung up the settlements of *Rio Frio* and *La Fundacion*, both on the same affluent of the lagoon, while planters from Bogota have established themselves in

SANTA MARTA—VIEW TAKEN FROM THE NORTH.

the old Indian village of *San Sebastian de Rabago*, at an altitude of 6,500 feet, in the very heart of the Sierra Nevada.

Dibulla—Villanueva—Espiritu Santo.

On the almost uninhabited north-eastern coastlands, *Dibulla*, formerly *San Sebastian de la Ramada*, lies some 60 miles due east of Santa Marta. At this point the shore-line begins to trend north-eastwards in the direction of *Rio Hacha* (*Riohacha*), the last Colombian station on the Caribbean Sea. Beyond it stretch the unproductive steppes roamed by the Goajiro Indians. The salines along this section of the coast are almost abandoned, although containing a supply of salt sufficient for millions of people.

Bahia Honda, on a deep inlet at the extremity of the Goajira Peninsula, is the place which Bolivar is said to have regarded as a favourable site for the future metropolis of all Spanish America. A railway might easily be constructed from this point through *Soldado* and over the low pass in the neighbouring sierra down to the Magdalena basin. This line would pass several towns and stations, amongst others *Valledupar*, capital of the Rio Cesar district, formerly a flourishing settlement, which was founded in the middle of the sixteenth century, and which is noted as the residence of Castellanos, poet of the Colombian Conquest.

Villanueva and *San Juan de Cesar*, higher up the Cesar valley, have lately acquired some importance from the coffee plantations that now cover the first slopes of the Sierra Negra. The extensive savannas of the same valley support numerous herds of cattle, destined chiefly for the Cuban market.

Skirted on the north side by the territory of the Arhuaco Indians, with its capital, *Atanquez*, and on the south by that of the Motilones, whose central station is *Espiritu Santo* (*Codazzi*), the lower course of the Rio Cesar is also attracting settlers, thanks to the development of stock-farming and of its cacao, coffee, and tobacco plantations. The northern spurs of the Sierra Nevada, culminating in the Alto de las Minas group, abound in coals and minerals.

Cartagena.

Cartagena de las Indias, about 65 miles south-west of the Magdalena delta, was founded in 1553 by Pedro de Heredia under the name of *Calamar*, a name which was afterwards transferred to the riverine station at the head of the canal connecting it with the Magdalena. Finely situated on a cluster of islets forming the harbour, Cartagena, with its suburb of *Jijimani* (Gethsemaneh), reposes in the shade of Mount Popa, an abrupt eminence dominating the east side of the narrow strait. Church towers, the old palace of the Inquisition, and other buildings rise above the line of old ramparts, which form a circuit of some miles, and on which Spain lavished the prodigious sum of nearly £12,000,000. Nevertheless, this famous stronghold of Spanish power in the New World had, like all fortified towns, to undergo frequent sieges. In 1741 the English Admiral Vernon lost 7,000 men

with a part of his fleet in a vain attempt to capture the place. In 1815, during the War of Independence, the "Heroic City" held out for four months against over 8,000 Spaniards, who, on entering the town, found it almost abandoned by the living and its streets choked with the dead.

But Cartagena never recovered the prosperity for which it was indebted mainly to Government monopolies. In the subsequent rivalry with its neighbours it has been outstripped by Barranquilla, and its population is at present one-third less

Fig. 81.—Cartagena and its Harbours.

Scale 1 : 220,000.

than during the last century. Besides the loss of its privileges, other causes have contributed to its decadence. The islands being destitute of springs, the inhabitants have to depend on the rain-water husbanded in cisterns; but a still more serious drawback is the absence of easy access either by roads or canals with the Magdalena.

Cartagena possesses a group of extensive and perfectly safe harbours, formed by a tongue of land projecting southwards in the direction of the elevated islet

of Tierra Bomba, which is itself separated by a narrow channel from a northern promontory of Baru Island. The marine inlet thus enclosed has a superficial area of no less than 15 square miles, with an average depth of from 10 to 15 fathoms. But the approaches are difficult, the southern passage between Baru and the mainland being fordable by cavalry, whence its name, "Pasa Caballos."

The south-western entrance of Boca Chica ("Little Mouth") is wide enough only for a single vessel, while the Boca Grande ("Large Mouth") has been completely closed by an embankment which cost thirteen years of labour (1775 to 1788), and an outlay of nearly £300,000. Communication is afforded with the Magdalena by the Calamar Canal, which, however, reaches the coast at an inlet some distance south of the roadstead. This winding passage has been at different times deepened or re-excavated, but only for small steamers, the mean depth at no time exceeding 8 feet.

Nevertheless, Cartagena possesses in the neighbouring plantations and pastures the elements of a local traffic which, when fully developed, may prove more profitable than the foreign trade, which is almost entirely in the hands of the English. When easy access is given to large vessels, and the railway completed to the Magdalena basin, this place cannot fail to recover its former prosperity. Of the agricultural centres which gravitate towards Cartagena, one of the best known is *Turbaco*, the ancient *Yurbaco*, where the Indians successfully resisted the advance of Hojeda in 1510. Amongst those killed in the engagement was the famous pilot, Juan de la Cosa.

Tolu—Lorica—Quibdo—Urrao.

For some years the Gulf of Morosquillo, with its south-western inlet, *Puerto Cispata*, has been coming to the front. Here debouches the Rio Sinu, the "Colombian Pactolus," which traverses a district even more productive in agricultural produce than in mineral wealth. *Tolu*, on the shores of the gulf, was founded by Alonso de Heredia in 1535, and does a brisk trade in colonial produce, including the balsam named from this place. But at present settlers are attracted chiefly to the Sinu valley, and to its capital, *Lorica*, which lies below a labyrinth of channels communicating with the mainstream, and navigable by steamers. This district of the lower Sinu is being rapidly settled, and promises to become an important centre for the export trade in timber, cabinet-woods, cacao, ipecacuanha, and vegetable fibres. The ipecacuanha plant, which formerly grew wild, is now cultivated on the *Monteria* plantations, owned by a French company.

The San Andres, Providencia, and Santa Catalina islands in the Caribbean Sea, off the coast of Mosquitia, are dependent on the department of Bolivar, and not on that of Panama as might be supposed from their geographical position. Westwards, the basin of the Rio Leon and of the Atrato, confined between the Western Cordillera and the Panama range, belongs to the department of the Cauca, a vast territorial division still but thinly peopled, with many districts quite uninhabited. Such is the valley of the Atrato, one of the richest but, at the same

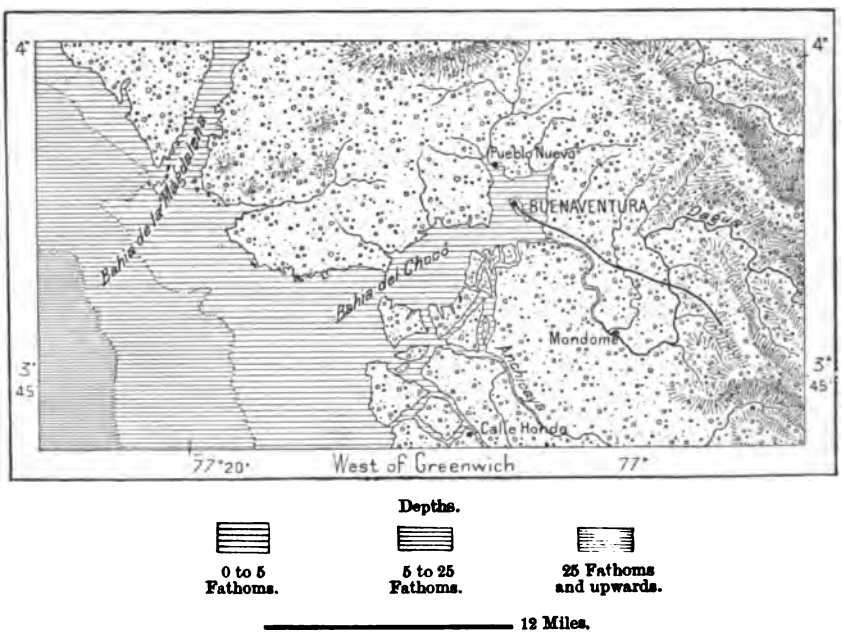
time, one of the unhealthiest regions in the world. In 1885, White estimated its entire population at about 40,000, of whom three-fourths were negroid half-breeds and one-fourth whites, whose chief resources were gold, gums, rubber, bark and other drugs collected in the forests.

Quibdo, the chief place in this basin, lies on the right bank of the Atrato, 250 miles above its mouth, and below the Cuia confluence. The neighbouring hills contain coal- and copper-mines, and at certain seasons prodigious shoals of fish ascend the river, which has an average depth of 10 feet, and is navigable for steamers to this point.

A bad road, crossing the Western Cordillera at a height of 6,800 feet, connects Quibdo with *Bolivar*, in the Cauca valley. But the stream of migration to these

Fig. 82.—Port of Buenaventura.

Scale 1 : 650,000.



uplands sets chiefly from Antioquia, whose enterprising citizens have already founded several settlements, such as *Urrao*, near the source of the Murri affluent of the Atrato; *Cañasgordas* and *Frontino*, about the headwaters of the Sucio, which joins the Atrato above its delta.

Novita—Buenaventura—El Castigo.

In the upper basin of the San Juan, whence comes much of the platinum used in the world, the chief centre of population is *Novita*, which, like Quibdo, is built on piles. On the neighbouring Pacific coastlands the only port visited by skippers is *Baudo*, which lies on a tidal river of like name.

Buenaventura, on an islet at the eastern extremity of a long inlet south of the Rio San Juan, attracts to its port about three-fourths of all the foreign trade of the Cauca basin. The deep and well-sheltered bight had been discovered in 1530 by Pascual de Andagoya, who ascended the Rio Dagua, which here reaches the coast, and passed thence over the Cordillera to the interior. But nothing was to be seen on the spot but a few fishermen's huts till the year 1821, when the city of Buenaventura was officially founded. On the mainland the suburb of *Pueblo Nuevo* stands on the banks of a shallow estuary facing the north side of the island.

Although the busiest seaport on the Pacific coast of Colombia, Buenaventura has but a small foreign trade compared with that of Barranquilla. But a great development is expected on the completion of the railway crossing the Cordilleras down to the Cauca valley.

South of Buenaventura follow a few little ports, such as *Micai*, *Timbiqui*, and *Isquande*, over against the seven-peaked island of Gorgona, with *La Gorgonita* at its southern extremity. Most of the territory between this point and the Ecuador frontier is comprised within the basin of the Patia, which is better peopled than any other fluvial valleys draining to the Pacific.

Here the breezy uplands, relatively cold but healthy, are occupied by *Almaguer*, *Bolivar*, and several other towns and villages, whose inhabitants carefully avoid the low-lying coastlands. The negroes and half-castes alone are able to resist the debilitating climate of these fertile but oppressively hot districts, which yield abundant crops of the finest tobacco and other agricultural produce. In the *El Castigo* (*Rosario*) district the cacao plantations, covering a space of about 100 acres, and dating from the beginning of the present century, contain some trees 130 feet high, whose fruit still retains its full flavour. Some of the slopes are clothed with trees matted together by the coils of the vanilla climber, whose powerful aroma is wafted on the breeze to distances of many leagues round about.

Tuquerres—Pasto—Tumaco—Ipiales.

Towards the Ecuador frontier the plateau is occupied by the two important towns of *Tuquerres* and *Pasto*, which give their names to the neighbouring volcanoes, and which lie, one to the west, the other to the east, of the Guaitara affluent of the Patia. Tuquerres, so named from an extinct Indian tribe, stands at an altitude of 10,035 feet, or 100 feet higher than Mucuchies, in Venezuela. From its sloping terrace a marvellous view is commanded of the surrounding volcanoes, of the plateaux above which they rise, and of the gorges by which their flanks are furrowed.

Pasto, although less elevated, stands at about the same height as Bogota, and enjoys a similar climate. This city, lying about midway between Quito and Popayan, replaced in 1539 the settlement of *El Madrigal*, founded two years previously by Belalcazar. Formerly included in the diocese of Quito, and

connected with the southern Quichuas by their customs and traditions, the Pastusos constitute an original ethnical group differing greatly from the other inhabitants of Colombia. Their city, the "Lioness of the Andes," remained loyal to the crown of Spain for over ten years after the declaration of independence in the other provinces, and surrendered to Bolivar only after the sanguinary battle of *Bombona*, on the slopes of the Pasto volcano.

The Pastusos have their special industries, and their *ruanas* (ponchos or smocks), made of wool, cotton, or other durable fabrics, are noted for their fast colours, which are fixed with ashes, the juice of wild lemons, and the sulphuric acid obtained from the sulphur of the neighbouring volcanoes.

Barbacoas, the chief place in the lower Patia basin, lies on the Telembi affluent, which, like the mainstream itself, is navigable by steamers. From Barbacoas to Tuquerres, the nearest town on the plateau, the route ascends a height of 10,000 feet by sharp zigzags, over precipices, across ravines and narrow gorges. At some of the more difficult points the pack animals are replaced by men, the so-called *cargueros* or *estriberos*, who carry goods and even passengers on their backs secured by leather straps passed round their foreheads.

Tumaco, the port of Barbacoas, lies on an islet a little to the north-east of the mouth of the Rio Mira. This place has lost much of its traffic since the *tagua*, or vegetable ivory, till recently the staple of its export trade, has fallen in price on the German markets. Some other islets on this coast are completely uninhabited.

With the marine custom-house of Tumaco, towards the Ecuador frontier, corresponds the inland custom-house of *Ipiales*, a station standing at an elevation of 10,110 feet on the Males affluent of the Guaitara. But the traffic of this place is insignificant, doubtless owing to the development of the contraband trade between the conterminous states.

Material Condition of Colombia.

The population of the republic continues steadily to increase from year to year, and from decade to decade, despite the murderous civil wars, the insalubrity of the low-lying plains and of the hot moist valleys. The period within which the inhabitants are doubled may be estimated at about fifty years. This movement, although much slower than in the United States, Chili, Argentina and Uruguay, is far more rapid than in Bolivia and Peru. In the department of the Cauca the increase has been eightfold, and in Antioquia twelvefold, since 1778. The colonisation of the interior, spreading chiefly from Antioquia, proceeds, if not rapidly at least continuously, every inland town forming a little centre of dispersion for the surrounding districts. A century ago the Antioquians represented a seventeenth, at present (1893) they constitute no less than one fifth, of the entire population.

Of all the departments Panama alone has received any large number of emigrants, negroes from Jamaica, Chinese, Europeans, all in connection with the

Panama Canal works; but since the suspension of that project an exodus has taken place in the opposite direction. Altogether not more than about 10,000 foreigners are supposed to be at present resident in the republic. In 1883 the returns for Bogota gave only 455 in a total population of nearly 96,000.

Colombia still remains but thinly peopled, over half of the territory being almost uninhabited, while the relatively better-peopled districts are interrupted by vast solitudes. The boundless spaces roamed exclusively by the wild tribes are even decreasing in population, owing chiefly to the ravages of small-pox. Amongst the Colombians proper there is an excess of about 100,000 women over men (2,150,000 and 2,050,000 respectively). According to Vergara the annual increase by the excess of births over deaths averages from 80,000 to 85,000.

Certain epidemics are prevalent, especially on the swampy coastlands, where marsh-fevers often assume a virulent character along the shores of the Caribbean Sea, while yellow fever or some analogous disorder occasionally ravages the low-lying plains. Dysentery is almost equally dreaded, and cutaneous diseases are very common, particularly amongst the negroes and half-breeds. Of late years leprosy has also made its appearance, and seems to be rapidly spreading in many districts, but mainly in the provinces of Santander and Boyaca. Those tainted by this loathsome affection already exceed 20,000, and goitrous subjects are even more numerous, being met in all the dark and gloomy upland valleys, especially in the upper Magdalena and Cauca basins.

As the great bulk of the population still belongs to the peasant class, industrial pauperism has not yet invaded Colombia, and although there is no lack of poor, there are no proletarians. All have at least sufficient bread, except when famine is caused in certain districts by inundations or the plague of locusts. Slavery was abolished over fifty years ago; nevertheless, servitude may be said still practically to exist, for the system of small free holdings is far from general, while the peasantry, always burdened with debts, are obliged to work like coolies on the large estates.

But Colombia still possesses a vast reserve of waste lands, more than sufficient for the needs of a rural population twenty times more numerous than the present. In 1890 the state had at its disposal over 250,000,000 acres of such lands, and during the two previous years the public domain had diminished only by about 130,000 acres.

Settlers chiefly select wooded tracts, where the trees have to be felled, left to dry for several months, and then fired at the risk of infection from the half-burnt bodies of the innumerable reptiles and other animals destroyed by the conflagration. The rotation of crops usually begins with maize, which the first season yields enormous returns; but after two or three harvests the clearings are often abandoned, and are soon again clothed with forest growths.

The alimentary plants vary with the altitude and from province to province. In the hot lands the staple food is yucca bread (manioc), eaten with bananas, of which, according to the local saying, there are as many varieties as days in the year. The most esteemed is the large *platano*, which is roasted under the embers,

usually with the addition of a *panela*, or lump of sugar. In the temperate zone maize takes the place of manioc, while wheat and potatoes prevail on the cold uplands, and *oca* (*oxalis tuberosa*) of a delicate flavour on the higher grounds, such as the Pasto plateau, at altitudes of 10,000 feet and upwards. Certain species of the solanum (*S. galeatum*) yield fruit of a fine golden hue, preferred by the natives to oranges. In Socorro and some other districts, oats, beans, and potatoes are cultivated up to a height of 11,500 feet, and at this altitude the potato is exempt from blight.

Both in the temperate and hot zones, tillage, carried on only in the more favoured localities, yields astonishing results, maize in many parts of the Cauca valley as much as three-hundredfold. Most of the plants of the European temperate lands are of late introduction, and it is curious to note that the peach, brought with them by the first settlers, has become so far acclimatised that it never loses all its foliage, whereas the pear, a more recent arrival, is still deciduous, as in Europe.

Although contributing little to the general trade of the world, Colombia has begun to export various products of the land, such as the coffees of Santander and Cucuta, and the tobaccos of Carmen, Ambalema, and the Cauca valley. Most of the other exports, vegetable ivory, bark and gold, are natural produce. Stock-breeding is more important in some districts, as in the savanna of Bogota, than agriculture proper, and in this respect there has been a retrograde movement since pre-Columbian times. According to certain rough estimates, the Colombian llanos support relatively fifty times less cattle than those of Venezuela, but they were far more productive before the herds of the natives had been plundered by the whites.

Pigs, introduced in 1536, have readily adapted themselves to their new environment, while undergoing slight modifications according to the different food and climates. Most of them resemble the wild boar with their pointed ears, broad head and uniform colour, usually black. But in the hot valleys they have become ruddy, like the young peccary, and on the bleak paramos, exceeding 8,000 feet in altitude, they assume a thick coat, often somewhat curly, and in some cases with a kind of woolly undergrowth.

Analogous changes have affected the European sheep: thus in the torrid zone the lamb still retains its wool; but, unless shorn at the proper season, this wool becomes matted and felt-like, at last dropping off in cakes, revealing an undercoat of short glossy hair, like that of the goat. The goat itself has grown smaller, but at the same time more graceful and nimble than its Sicilian congener.

The natives have domesticated some of the wild animals, such as the *saina*, a species of peccary, as faithful and intelligent as the dog, and the *guacharaca*, a bird about the size of a fowl, but like a turkey in shape, which breeds freely with Andalusian poultry. In their farm-yards is also seen the iguasa (*chenalopex jubata*), which resembles the duck in appearance. Geese were unknown on the Bogota plateau before the beginning of the present century.

From the reports of the first settlers and the later researches of geologists, it

is evident that Colombia abounds in minerals, and as many as 40,000 hands are already employed in the mining industry. Few rivers probably roll down more auriferous sands than the unhealthy Choco. But mining operations have hitherto been confined to the temperate districts, where the foreign engineers enjoy a climate like that of West Europe. In the course of three hundred and fifty years Colombia has yielded a quantity of gold and silver valued at £140,000,000, or

Fig. 83.—Landing-stage at Salgar, Port of Savanilla.

about £400,000 a year. Antioquia, which at present supplies about two-thirds of the auriferous ores, possesses hundreds of known gold-mines, the working of which is determined by the state of the money and labour markets, the facilities of communication, and similar outward conditions. Most of those in which the crushing process is needed belong to foreign, and especially English, companies, while the washings along the river-banks are left to the natives.

The silver-mines, actively worked under the Spanish rule, have for the most part been abandoned, and could scarcely be reopened during the present depreciation of the metal in the markets of the world. Copper, lead, and iron also occur, but next to gold, salt is the chief mineral industry. The yield might be greatly increased but for the Government monopoly, which limits its operations to supplying the local demand. To the state also belong the emerald-mines of Muso, while the pearl-fisheries of Rio Hacha and the Gulf of Panama are private property, but of little value.

The industrial arts can scarcely be said to have made any perceptible progress since pre-Columbian times. In the same towns, villages, and districts the same simple crafts are still pursued, confined chiefly to the production of hammocks, coverlets, ponchos, straw hats, sacks, wallets, and such-like homely wares. But these are amply sufficient to reveal the natural taste of the natives for colour and form. Every earthenware utensil, every woven fabric, every object of daily use is in some districts stamped with a distinctly original character in its design, shape, and harmonious tints.

With twice the population of Venezuela, Colombia still lags behind the conterminous state in its foreign relations. This inferiority appears due in part to the relative geographical positions of the two countries, in part to the peculiar configuration of Colombia, where economic life is developed mainly on the inland plateaux at great distances from the seaboard, and with difficult approaches greatly enhancing the price of foreign wares destined for the interior. Hence this state is driven to produce on the spot, in however rude a way, many things that Venezuela is enabled to import from abroad at moderate charges for freight.

According to the custom-house returns the total foreign trade of Colombia amounted in 1890 to about £4,000,000, exclusive of the movement in the free ports of the Isthmus of Panama. But the official figures may be deceiving, in consequence of the different rates of exchange, imports being valued in pounds sterling, dollars, and francs; while the exports are calculated according to the Colombian *peso* (dollar), nominally 4s., but really worth only 3s. 4d. Thus the exports according to the official tables are greatly superior to the imports, whereas the contrary is the case. Nearly all foreign dealings take place with Great Britain, the United States, France, and Germany, in the order of importance here given.

The shipping continues steadily to increase from year to year, although still inferior to that of a second-rate European port, such as Plymouth or Dunkirk. Nine custom-houses have been established by the Government—four on the Atlantic: Rio Hacha, Santa Marta, Barranquilla, and Cartagena; two on the Pacific, and two in the Orinoco basin; and one on the frontier of Ecuador (Ipiales).

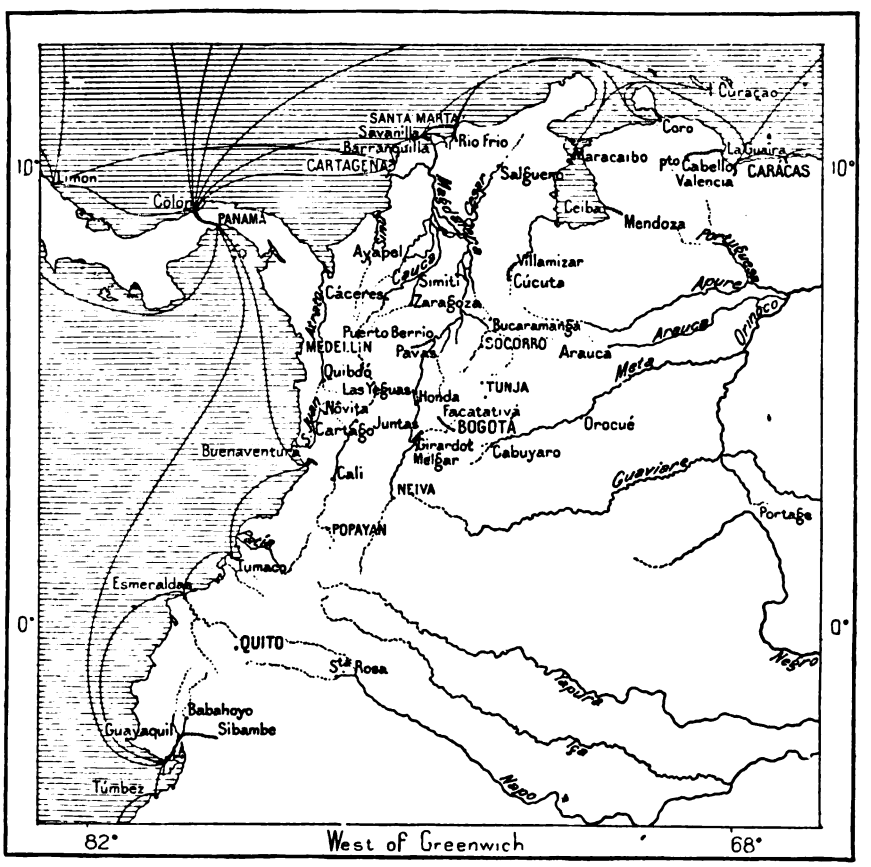
The gold coinage, which is no longer issued by the mints of Bogota and Medellin, has almost disappeared from circulation, and gold is now known only as an article of trade. Even silver has become rare; it is no longer sufficiently

abundant for commercial dealings, and has to be supplemented by paper money, limited by an Act of 1887 to 12,000,000 pesos.

Little development has taken place in the means of facilitating communications except as regards navigation. As early as 1825 steamers were already plying on the Magdalena; but this first attempt ended in failure, and no regular service was established till 1847. In 1890 as many as twenty-five steamers were plying

Fig. 84.—Communications of Colombia.

Scale 1 : 16,000,000.



between Barranquilla and the rapids, the ascent averaging eight, and the descent from three to four days. Steam has also penetrated into the upper reaches of the main artery, as well as into the Cauca, both above and below the dangerous section of that river traversing the province of Antioquia. Steamers are now also navigating the Atrato, the San Juan, the Patia, as well as the numerous affluents of these rivers and of the Magdalena. Moreover, a contract was signed in 1890 with a steamship company which undertakes to place two boats on the

Meta to ply as far as Orocué, 370 miles from the confluence, in the dry season, and as far as Cabuyaro, at the foot of the mountains, during the floods.

Although no regular railway system has yet been developed, Colombia still possesses a few short lines, nearly all at present stopping in the marshy lowlands at the foot of the inland plateaux. Of the three ports that may be regarded as belonging to the Magdalena delta, Savanilla has been connected with the great river since 1892. But the Buenaventura line is still arrested in the forests of the Rio Dagua ; nor have any of the large inland cities—Bogota, Bucaramanga, Antioquia—any direct access by rail to the lower valleys. All, however, enjoy telegraphic communication with each other and with the outer world, through the junctions effected at Colon, Panama, and Buenaventura with the submarine cables.

The principle of compulsory instruction, several times recognised since 1870, is no longer maintained by the present Government. Most of the inhabitants are still destitute even of a rudimentary education, and in the department of the Magdalena, where the only periodical is the official journal, six of the so-called high schools are said to have been closed in 1891 for lack of teachers. The actual attendance at school may be estimated at 100,000, or about one-fortieth of the whole population. But the proportion of those who can at least read and write greatly exceeds the number of those who have passed through the public schools.

At Bogota, centre of Colombian culture, the first printing-press was set up in 1738, and the first journal appeared in the same place in 1785. A great commotion was created by a professor who in 1763 first proclaimed the doctrine that the earth turns round the sun, and even still public instruction is "organised and directed in accordance with the Catholic religion," and is therefore required "to react against utilitarianism, materialism, and impiety." The press, also, "free in time of peace," must abstain from attacking the Catholic Church "in any way whatsoever."

Administration.

After long constituting a federal republic on the model of the United States, Colombia has, under conservative influences, abolished the autonomous states, and returned to the former centralising system. But there can be little doubt that the new order will again be set aside by some fresh revolution, for the country is divided into two nearly equal parties, or, in other words, is in a state of unstable equilibrium.

Since the reaction of 1885 the nine federated states have become so many departments dependent on the National Assembly, which meets at Bogota, centre of the executive power constituted by the two chambers. The suffrage is also limited to men twenty-one years old exercising some trade or profession, holding some public office, or enjoying a yearly income. All citizens thus qualified elect the municipal councillors and the departmental delegates. But these voters in "the

first degree" do not directly elect either the deputies or the senators; they meet at an appointed place to form a junta, which nominates the "electors," who are charged with the nominations.

The House of Representatives is constituted by the nine departments, each of which returns one member for every 50,000 inhabitants. The candidates must be

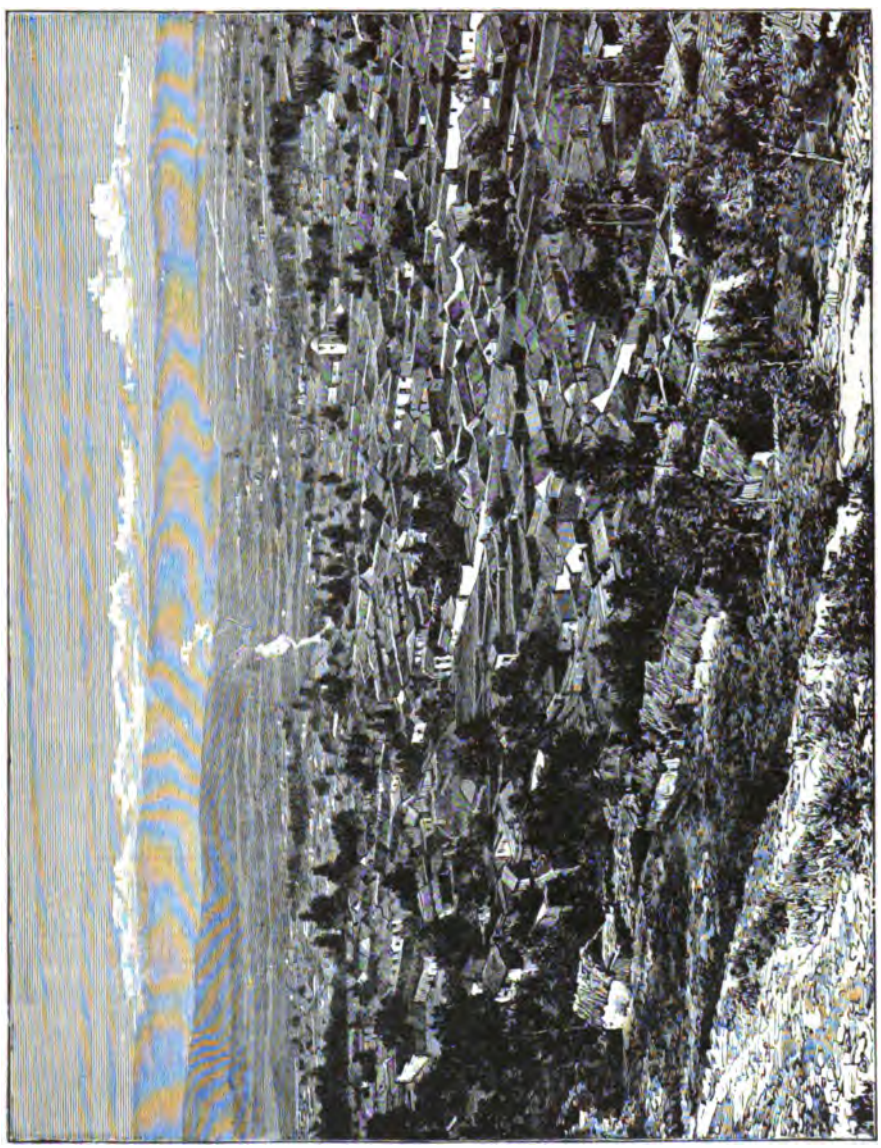


Fig. 86.—Panoramic View of Bogota; taken from the East.

twenty-five years of age, and are elected for four years, while the senators, nominated for six years in the proportion of three for each department, must be thirty years old, and in the enjoyment of an income of not less than 1,200 pesos. But to the twenty-seven thus elected by indirect suffrage the President adds six chosen by himself.

Congress, which meets only every second year, elects the President and the Vice-President for six years, and every second year nominates a "substitute" to replace the President in case of vacancy. The Senate has the right to judge the ministers, but no sentence is valid unless pronounced by a majority of two-thirds. The Council of State consists of six members, nominated, two by the President, two by the Senate, and two by the deputies.

The President, held to be irresponsible and re-eligible, can neither be deposed

Fig 86.—Administrative Divisions of Colombia.

Scale 1 : 20,000,000.

I. Magdalena.
II. Bolivar.
III. Panama.
IV. Santander.
V. Boyaca.
VI. Cundinamarca.
VII. Tolima.
VIII. Antioquia.
IX. Cauca.

500 Miles

nor impeached. He lacks nothing but the title of an absolute sovereign. He chooses his eight ministers, the departmental governors, the ambassadors, the councillors of state, the military chiefs, and most of the higher officials. The supreme court, consisting of seven judges nominated for life, and the lower courts also depend on the central government, and the militia formerly maintained by the several states has been suppressed. Capital punishment has been restored, except in the case of political offenders, and the civil code is almost a complete copy of

the Chilian code, which had already been adopted by the State of Cundinamarca in 1857.

Catholicism remains the national religion, and is administered by a hierarchy of one archbishop and seven suffragan bishops. Although the religious orders were abolished in 1863, several hundred friars still remain in the country. Toleration is extended to other sects, "so far as they may not be contrary either to Christian morals or to the laws."

Each department is governed by an administrative assembly, chosen in the proportion of one deputy for every 12,000 inhabitants, and meeting, like Congress, every two years. The departmental prefects are nominated by the governor for two years, and the prefects in their turn appoint the magistrates of the municipal districts.

A different arrangement applies to the reduced Indians living in the tribal state. The civil government, "in accord with the ecclesiastical authorities," recognises the cacique and the *cabildo* (tribal council) alone, this body being elected in conformity with custom. The chiefs have to see that each family receives its share of the *resguardo*, or tribal domain, in case of division, and also to prevent the alienation of such allotments.

Compared with that of most other states, the Colombian revenue seems insignificant. Although the population has increased at least fourfold since the declaration of national independence, the total amount of taxation has undergone no such development. Most of the taxes levied under the Spanish rule have been abolished; even the salt monopoly exists in a mitigated form, private persons being allowed under certain conditions to work the saline springs.

At present the revenue is derived chiefly from the customs, nearly all imports being taxed except agricultural machinery, scientific apparatus, books, and other educational aids. The budget for 1892 showed a deficit of about £470,000, and in the same year the foreign debt, with accumulated interest, amounted to £3,060,000. By Act of Congress, seven per cent. of the customs are set apart to meet these liabilities. The internal debt amounts at present to over £2,000,000, and most of the departments are also burdened with debt.

The peace footing averages about 6,000 of all arms, but the strength of the national army is determined from time to time by Congress. All able-bodied male adults are liable to military service in case of need.

In the Appendix is given a table of the nine administrative departments, with their superficial area, population, and capitals.

CHAPTER V.

ECUADOR.

I.

Extent—Disputed Frontiers.

Of all the Andine republics, Ecuador is the smallest and least populous. On both sides of the equator, from which it takes its name, it occupies not more than five degrees of latitude in a straight line, while from west to east the inhabited part of the country is still more contracted. Of its three natural divisions—Ante-Andina or Cis-Andina, Inter-Andina, and Trans-Andina—the first two alone form the true territory of the republic. The thinly populated Trans-Andine spaces are of small extent, and their population remains almost stationary.

Certain regions in this division are still absolutely unknown, while towards the east many tracts claimed by Ecuador are contested by her powerful neighbours. Beyond the inhabited provinces, the frontiers claimed by Colombia and Peru overlap on the plains inclined towards the Amazons, and apart from arbitration, one or other of these states can hardly fail to get the better of Ecuador, weakest of all the Andine republics.

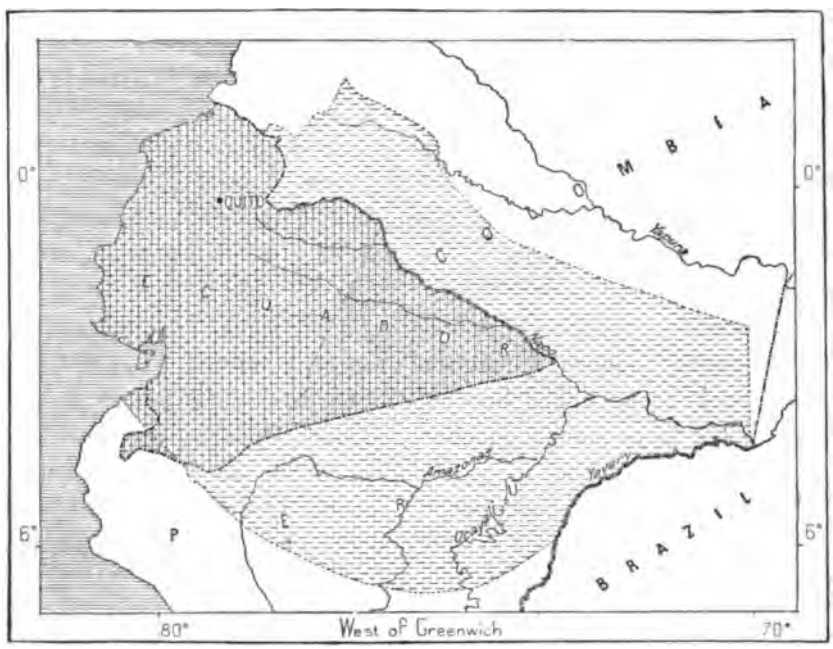
Before the recent conventions, which have not yet been definitely ratified, Ecuador had officially a superficial area of 286,000 square miles; but the actual area cannot be estimated at more than 160,000 square miles. It comprises little more than the plateau less the Trans-Andine territory, and Colombia even threatens to seize a portion of what still remains. Even on the Pacific slope disputes have arisen on the subject of frontiers. In the north Colombia has occupied both sides of the Rio Mira as far as the Matajé creek, although Ecuador claims all the territory up to the left bank of that river. In the south, also, a part of the Rio Achira basin is contested by Peru.

History—Geographical Exploration.

Despite its greater distance from Europe, Ecuador was conquered by the Spaniards a few years before they penetrated to the Colombian plateau. Attracted by the treasures of the Incas, Pizarro had already completed his destructive march across Peru five years before the three bands of invaders had met from different quarters on the Cundinamarca tableland. In 1533 a body of about 300 men, including 80 horse, was led by Belalcazar from Peru northwards, in the direction of the kingdom of Quito, that is, the present state of Ecuador. He met with a

Fig. 87.—Disputed Frontiers of Ecuador.

Scale 1 : 14,000,000.



stout resistance from the reigning sovereign, Rumiñahui, himself a usurper, and might have even been repulsed but for an eruption of Cotopaxi, attended by fearful rumblings and a fall of ashes on the battlefield. The Indians, terrified by the unfavourable omen, dispersed in all directions, and the Spaniards entered the city of Riobamba without further resistance. The conquest was already effected; nothing remained except to massacre the natives and plunder their tombs and temples.

The "kingdom" of Quito, which depended alternately on the vice-royalties of Peru and New Grenada, and which was officially designated as an *audiencia*

or a *presidencia*, had no political history under the Spanish rule. It was, however, the scene of a memorable event in the history of the sciences—the measurement of an arc of the meridian by Bouguer, Godin, La Condamine, and the brothers Ulloa. This important determination enabled La Condamine to supersede Samuel Fritz's map by a more accurate cartographic document; special attention was at the same time directed to the plateaux and volcanoes of this region, which were then and long after supposed to be the highest on the globe.

During the Spanish regime Humboldt and Bonpland also came to study the orography, geology, and botany of the land, making those famous ascents of Chimborazo and Pichincha which raised so many questions on the vertical disposition of climates and floras.

Scientific exploration was interrupted by the War of Independence and the subsequent political convulsions; but since the establishment of order Ecuador has been frequently visited by naturalists and students, such as Spruce, Wisse, Reiss and Stübel. But the interest attaching to volcanic phenomena has tended to concentrate research on the regions already made classical by the labours of La Condamine, Humboldt, and other pioneers. Even Edward Whymper's recent journey, so important in some respects, covers only a small part of the territory of Ecuador.

Thanks, however, to various geodetic determinations, geographers have been enabled to rectify the older maps in some essential points. Thus it results from the marine surveys, and from those of the engineers engaged in laying down roads and the tracks of future railways, that the whole of the Andine system must be bodily shifted from 12 to 25 miles farther east than was supposed by Humboldt and subsequent cartographers. In this respect the fundamental work on Ecuador is that published by the geologist Wolf in 1892, embodying the results of twenty years' travels and studies.*

Ecuador is certainly increasing in population, which, even according to the most cautious estimates, has doubled since the proclamation of independence. Nearly all the elements of progress are drawn from her own resources, for there has been no immigration in the strict sense, except of the Pastusos from Colombia. Even adventurers and fortune-hunters seldom penetrate far beyond the coastlands, being little attracted towards a region where the inhabited districts have a rigid climate and poor soil, where volcanoes flame, and the ground quakes almost incessantly beneath the peasant's ploughshare, where the highways lead over formidable passes exposed to glacial winds and snowstorms.

The very sadness natural to the Quichuas, their sullen temperament combined with the gloomy environment, may have even tended to repel immigrants from brighter climes. Nevertheless, the construction of roads, already begun, cannot fail to open up for settlement the more favourable tracts, both on the Pacific and Amazonian slopes of the Andes.

* Teodoro Wolf, *Geografia y Geologia del Ecuador*.

II.

Physical Features—The Ecuadorean Andes.

Viewed as a whole, the Ecuadorean Andes, stretching from the Pasto to the Loja group, present a distinctive character in their relief, which has been compared to a ladder of primitive construction with rude and twisted rungs, varying in thickness, and following at irregular intervals. Eastwards runs the main range, the "Royal Cordillera," as it is called, whose waters all descend to the Amazons. Although Chimborazo, the culminating point of Ecuador, lies in the western range, this eastern chain has a greater mean altitude (about 13,000 feet), while its crystalline rocks give it the first place in point of geological age. It consists, partly in its northern, and altogether in its southern, section, of granites, gneiss, and slaty schists, rocks which in the Western Cordillera nowhere crop out except in the deepest valleys. Here the prevailing formations are mesozoic strata, probably cretaceous, dominated by diorites, porphyries, and other rocks of igneous origin.

Despite its generally more regular trend, the eastern system presents a double curvature, the first concave, the second convex, towards the plains at its foot. The parallel western range follows an analogous direction, but with far more numerous local irregularities and breaks in its normal disposition. So frequent, in fact, are these breaks that Whymper went so far as to deny the existence of the range as such, regarding the western edge of the main (eastern) chain merely as "a certain sequence of peaks more or less in a line with each other." * But whatever name be applied to this line of domes and crests, it remains none the less a rim parallel to the greater Cordillera, and it is certainly regarded by the inhabitants as a distinct range, broken into fragments by numerous river-valleys. The Royal Cordillera is pierced through and through only by the two rivers Pastaza and Paute, whereas the western chain is interrupted by no less than seven watercourses having their sources in the upland basins of the interior. The Mira, the Guallabamba of Quito, the Chanchan of Alausi, and, farther south, the Cañar, Jubones, Tumbez, and Achira have all forced their way through the western mountains, or rather, they have preserved their valleys despite the upheavals and foldings in the neighbourhood of the seaboard.

Thus the contrast between the two systems is very marked from the hydrographic as well as from the geological point of view. But they resemble each other in the volcanoes which have raised their superb cones above the vast Ecuadorean pedestal. The transverse ridges connecting both cordilleras from the Colombian frontiers to the Cuenca basin also consist in a great measure of eruptive cones. Ecuador, like south Colombia, is thus disposed by these intermediate "rungs of the ladder" into so many separate basins, probably of lacustrine origin, which stand at a mean altitude of about 8,000 feet, but the beds of which have been disordered by erupted matter and by erosion.

* *Travels amongst the Great Andes of the Equator*, p. 335.

Volcanoes: Cotocachi—Imbabura.

In the extreme north the first basin is that of Ibarra, so named from the town which occupies its centre at a height of 7,300 feet, and which stands on an affluent of the Mira, the frontier river towards Colombia. West of this basin a distinct range is formed by Cotocachi ("Salt Mountain"), Yana-Urcu ("Black Mountain"), and other volcanoes, while eastwards rises gloomy Imbabura, its black sharp-pointed crater standing out in almost solitary grandeur against the blue sky.

Cotocachi, scaled by Whymper, shows no visible crater between its two terminal peaks, though the intervening space, now filled by a glacier, may have formed an old igneous vent. Lake Cui-cocha floods a depression at the south-eastern base, which was formerly a crater with two cones still rising above the surface. The slopes of Cotocachi up to a considerable height are furrowed in all directions by deep fissures disposed at various angles to each other, and forming a chaos of gorges very difficult to cross. Some of the cracks are as much as 6 miles long, and so precipitous that they have to be turned like the crevasses of a glacier. The inhabitants of the district are unanimous in attributing them to earthquakes, and several are shown 60 or 70 feet wide which were suddenly opened during the great convulsion of 1868.

This tremendous disturbance appears to have been propagated from south to north beneath the Ibarra basin, rebounding from the Colombian mountains upon Ibarra, where 20,000 persons are stated to have perished. Towns and villages were completely razed to the ground, with a total loss of some 50,000 lives. In many places the houses were bodily swallowed up, and during the shock Imbabura is said to have discharged a perfect deluge of mud and water, drowning the flocks on the lower pastures. The deep lake of San Pablo, 5 miles round, which lies near Imbabura, close to the north foot of Mojanda, may perhaps have contributed to this local discharge. Mojanda, forming the transverse link between the two cordilleras at this point, falls below the snow-line.

Cayambe—Sara-Urcu.

Between the Ibarra and the Quito basins the divide is formed by Cayambe, third or fourth highest peak of Ecuador. Lying just north of the equator, this triple-crested mountain presents an aspect no less imposing than Chimborazo itself, its glaciers and snowfields (explored to the highest summit by Whymper) towering some 6,000 feet above the bare rocks of the range. By following the course of the streamlets, which rise on the western slopes of the extinct volcano, and which converge to form the Rio Guallabamba, the traveller enters that prodigious avenue of burning mountains which has no rival in the whole world. On all sides are seen cones of igneous origin; even the long crests and the so-called *panecillos*, or bladder-like knolls dotted like bosses over the surface of the inner basin, consist of lavas, scoriæ, ashes, and other erupted matter.

IBARRA, AND THE IMBABURA VOLCANO.

The first mountain seen to the south-west of Cayambe, beyond the upland combes where rise some of the headwaters of the Coca affluent of the Napo, is Pambamarca, called also Francès-Urcu, or "French Mount," in memory of La Condamine's geodetic studies. Then follow Guamani and other superb crests, not however, reaching the snow-line, and to the east the snowy Sara-Urcu, scaled by Whymper with his Swiss guides, the two Carrels, at the cost of almost superhuman efforts.

According to Villavicencio, copied by Orton and others, Sara-Urcu has often emitted flames, and in recent times (1843, 1856) vomited showers of ashes, to the great alarm of the inhabitants of Quito. But some mistake must have been made as to the focus of these eruptions, for Sara-Urcu, ascended by Whymper, is not a volcano; its rocks consist of a micaceous gneiss, which in some places has the structure of slate. "I found that Sara-Urcu is only 15,502 feet high, that it is not a volcano, and cannot have emitted fire and ejected ashes, and that it lies considerably to the north of east of Quito at the distance of about 45 English miles [not 35 miles south by east of Quito, as stated by Villavicencio]. Instead of being the fifth in altitude of the Great Andes of the Equator, it proved to be the lowest of all the snow-peaks, and considerably inferior in elevation to several which scarcely reach the snow-line." *

Antisana, one of the giants of the Eastern Cordillera, is a huge mountain mass, 13,000 feet high, whose base covers a space extending some 18 miles north and south, and an equal distance east and west. It terminates in a long double-crested dome entirely snow-clad for a vertical height of about 3,500 feet, and sends down glaciers to the encircling combes. The ascent is extremely difficult and dangerous owing to the enormous crevasses by which the upper icecap is fissured. From a rent on the western slope flows a lava-stream 7 or 8 miles long, red on the surface and here and there clothed with lichens; three other streams of smaller size meander over the flanks of the mountain.

An eruption is said to have occurred in 1590, and at the time of Humboldt's visit in 1802 a column of smoke rose above the upper crest. In 1880 Whymper traversed a broad fissure in the ice, which emitted puffs of sulphurous vapour, but he saw no trace of a crater. Nevertheless, Reiss fancied he detected one in a depression on the east side, which is now filled by a thick glacier, and which discharges a sulphurous torrent, the Piedra Azufre, one of the innumerable head-streams of the Amazons.

Between Antisana and Cotopaxi stands Sincholagua, which has certainly no terminal crater, nor do the chronicles refer to any former eruptions from this mountain.

Cotopaxi—Llanganati.

Amongst all the Ecuadorean giants Cotopaxi stands out as the "ideal volcano." Of regular conic form with uniformly sloping flanks, Cotopaxi bears, not on a

* Whymper, *op. cit.*, p. 251.

shoulder or on any lateral crevasse, but on its summit, a large crater, which is still in constant commotion. At all epochs since the arrival of the white man in the country, history speaks of its eruptions.

The great disturbances, which take place at intervals of centuries, are dreaded far more for their torrents of mud than for their showers of stones. In 1877 the deluge of slush, water, ice, and rocks rushed down to the plains with a velocity of over half a mile a minute, sweeping away houses, bridges, and all other obstacles along its passage, and reaching the sea 280 miles distant on the very day of the eruption. The catastrophe had been heralded the day before by a huge column of black ashes which was projected to a height of 18,000 feet above the crater, and which, swaying with the east wind, was diffused widely over the Pacific. The steamships plying along the coast between Guayaquil and Panama found themselves suddenly wrapped in the darkness caused by the dense clouds of dust, and when the black shroud was lifted streams of molten red lava were seen boiling over the rim of the crater, melting the ice and snows and suddenly changing them to avalanches of mud and slush. Blocks of ice transported to the Latacunga plain, 30 miles away, remained on the ground for months, while the summit of the volcano, usually white with snow, became black and calcined except at some points left like islands amid the boiling sea of lavas. On previous occasions Cotopaxi belched forth flames which, according to La Condamine, shot up in 1743-4 to a height of at least 2,000 feet above the top of the mountain.

Cotopaxi, the flanks of which were figured by Humboldt with an exaggerated incline of about 50°, has a mean slope of not more than 30° on the north and south, and 32° on the east and west sides. Hence it may easily be scaled by climbers capable of resisting mountain-sickness. Moritz Wagner had to retrace his steps in 1858, but several have succeeded since the ascent of Reiss in 1872; and Whymper passed a whole night on the edge of the terminal crater in order to study the physiological effects of rarefaction on the human organism at an altitude of nearly 20,000 feet.

The surface heat was very perceptible on the outer wall of the crater, where the snow melted in many places as it fell. Consequently every snowfall was followed by vapours ascending in puffs from the slopes of the volcano, which seemed to smoke as if in a state of combustion. Nevertheless, a few narrow glaciers were formed in the ravines round about the cone, and these were here and there covered and blackened by a layer of volcanic scoriæ.

"At intervals of about half an hour the volcano regularly blew off steam. It rose in jets with great violence from the bottom of the crater, and boiled over the lip, continually enveloping us. The noise on these occasions resembled that which we hear when a large ocean steamer is blowing off steam. It appeared to be pure, and we saw nothing thrown out; yet in the morning the tent was almost black with matter which had been ejected. Steam unquestionably plays a leading part in the operations of Cotopaxi, and sometimes the quantity that issues is enormous. One morning in the following April, when encamped, at the height of 14,760 feet, on Cayambe, at a distance of about 60 miles to the north-north-east, just after

PUEBLO DE SAN MATEO, EAST OF LIMA.

WEST VIEW OF COTOPAXI, TAKEN NEAR SANTA ANA DE TUIPULLO.

daybreak we saw Cotopaxi pouring out a prodigious volume of steam, which boiled up a few hundred feet above the rim of its crater, and then, being caught by a south-westerly wind, was borne towards the north-east almost up to Cayambe. The bottom of this cloud was about 5,000 feet above us; it rose at least a mile high, and spread over a width of several miles. I estimated that on this occasion we saw a continuous body of not less than 60 cubic miles of cloud formed from steam. If this vast volume, instead of issuing from a free vent, had found its passage barred, itself imprisoned, Cotopaxi on that morning might have been effaced, and the whole continent might have quivered under an explosion rivalling or surpassing the mighty catastrophe at Krakatoa." *

The irregular rim of the crater, broken by vertical or even overhanging precipices, encloses a space 2,300 feet long from north to south and 1,640 from east to west, with a depth of about 1,300 feet. The various measurements of altitudes taken by travellers since the time of La Condamine offer many discrepancies for Cotopaxi, as well as for the other mountains of Ecuador. But as regards Cotopaxi, loftiest of all the still active volcanoes in the world, Whymper is inclined to believe that it has considerably increased in height during the last 150 years. In the Ecuadorean Andes it is overtopped only by Chimborazo, whose extinct crater has long been covered by a dome of snows and ice.

Cotopaxi is surrounded by several other cones, one of the highest of which is Rumiñahui in the north-west. Although scarcely reaching the lower limit of perennial snows, few eminences present a more majestic form than this volcano, whose crater, according to Reiss, has a depth of 2,645 feet. Rumiñahui, with its northern neighbour, Pasochoa, connects Cotopaxi with the Western Cordillera by the transverse Tiupullo ridge (Humboldt's Chisinche), which forms the parting-line between the northern basin of Quito and the southern Latacunga plain.

South-eastwards, a spur separating the upper Rio Napo valleys from the Rio Pastaza is continued to a great distance by the Quelendaña chain. Then trending round to the south and south-east, it terminates in the snowy Llanganati (Cerro Hermoso, or "Fairmount"), whose schistose mass rises in the midst of the surrounding forests to a height of 15,000 feet.

South of Cotopaxi the range, varying greatly in altitude, is prolonged by a wild and precipitous mass which, of all the Ecuadorean groups, most resembles the European Alps in its varied aspects. But its exploration has been scarcely begun, and little is known of its general character beyond what may be gathered from a distant view of its snowy peaks glittering in the sun. In 1875 Reiss ascended the slopes of Llanganati to the snow-line. The summit, from which flows a glacier, presents the aspect of a gloomy rampart, which seems quite inaccessible. Copper pyrites glisten in all the cleavages of the rocky mass.

Tunguragua—The Altar—Sangay.

The cordillera, interrupted by the deep gorge of the Rio de Baños (Pastaza), soon rises again to form the superb Tunguragua, which is all the more imposing

* Whymper, pp. 153-4.

that its base has been eroded by the river. Presenting a clean outline up to its truncated summit, this volcano is draped in snows and glaciers like the other giants of Ecuador. Its action is extremely irregular—quiescent for long periods, then suddenly bursting into violent explosions. In 1886 it ejected ashes to great distances, some falling on the port of Guayaquil, avalanches of mud at the same time rushing down its flanks and filling up the valleys at its base. The deluge was comparable to the tremendous outburst of Cotopaxi itself, but, instead of taking the direction of the Pacific across the intervening plateaux, it ran out in the valley of the Pastaza, on the Amazonian slope.

Tunguragua, like Imbabura, is one of those volcanoes which are most frequently mentioned as having ejected myriads of live fish together with the waters of some underground lake. But no direct observation has ever confirmed these reports, which are entirely discredited by Whymper. "As it is stated that the fish which are *supposed* to have been ejected from the crater, or to have been expelled from the subterranean reservoirs, were frequently alive, and had their flesh in good preservation, it appears to me there is stronger evidence against the notion that they dwelt in subterranean reservoirs than in favour of it. Fish cannot emerge in this rough manner from boiling water or from superheated steam alive, and with their skins intact. Possibly after some eruptions and earthquakes large numbers of these fish *have* been found out of water, but this would not prove ejection by or from volcanoes. Floods occasionally pour down the slopes of Cotopaxi, causing rivers to swell and to overflow their banks, and it would be no marvel if, during such inundations, multitudes of fish were borne from their native haunts, and left stranded when the waters subsided. Also, during earthquakes, fissures opening in the earth may change the course of streams, or might, by intersecting the beds of pools, drain them and leave shoals of fish high and dry, living and unscathed. In these possibilities there is, I imagine, the substratum of truth upon which a mountain of fable has been raised." *

The Altar, the Capac-Urcu ("Head Mountain") of the Quichuas, and called also Cerro de Collanes,† was, perhaps, at one time the loftiest mountain in Ecuador. According to the local tradition, the summit collapsed after a series of eruptions which lasted eight years and which occurred not long before the arrival of the Spaniards. To this collapse of the supreme cone has also been attributed the present picturesque form of the volcano, terminating in an altar encircled by peaks and needles. The old crater, which has the shape of a horseshoe broadly opening westwards, is at present filled with a glacier, above which hang long stalactites formed by the melting and re-freezing of the upper snows.

This nearly extinct cone is followed by Sangay, or the volcano of Macas, which rises in the midst of the woodlands, and which is said to have formerly been the most active in the whole region. Its upper slopes are at present clothed in a snowy mantle, except round about the rim of the crater blackened by fine dust

* *Op. cit.*, p. 254.

† Probably from *Collana*, which in Aymara (a sister language to Quichua) means "grand" or "sublime" (A. Stübel).

from the interior of the mountain, whose explosions appear to alternate with those of Cotopaxi. When one is agitated, the other, say the natives, is in repose; thus each of these vents would appear to become in its turn a sort of safety-valve for the whole district.

But of the two, Sangay is by far the more violent. From Guaranda, 60 miles distant, with the thickness of the plateau intervening, Whymper heard every morning, always between seven and eight o'clock, a dry sound like the rattle of musketry platoon-firing. In clear weather the cone is visible from the top of Chimborazo to a height of about 4,000 feet, and from this point is ejected, at intervals of 20 or 30 minutes, a jet of steam scarcely visible owing to its high temperature, but rising to a height of some 6,000 feet. At this altitude it expands into mushroom-like clouds with horizontal base, and then disperses southwards. Not a speck is seen in the azure sky, when a fresh jet starts up, which in its turn slowly dissolves in the same direction. Whymper calculates that these jets are projected into space at a velocity of no less than 22 miles per minute, while the southward drift shows the temporary, if not permanent existence of a current of air 22,000 to 23,000 feet above the sea, steadily setting due north and south. From another eminence of the Quito Andes, Reiss saw the outrush from the volcano, which was itself invisible. The vapour assumed the aspect of a black column, rising like a prodigious tower above the horizon; then, under the influence of the trade wind, drifting away to the Pacific.

From the top of Nagsangpungo, the "Mirador del Sangay" (13,235 feet), Stübel also obtained a near view of the smoking mountain. The mass of ashes ejected by the crater during its explosions would appear to represent an enormous cube equal in bulk to several large mountains. The country round about is covered to a great thickness with a grey dust, while the shifting dunes of this volcanic ash attain a height of over 300 feet. At times the rocky surface is swept by furious gales, revealing the mica-schist escarpments which form the primitive backbone of the cordillera. At times scoriæ are wafted from Sangay as far as Guayaquil, and on the plateau the pastures are often poisoned by the fall of volcanic dust. Patches of fresh snow are formed round the edge of the crater, and the ravines radiating from the upper cone are filled with blackened glaciers. Lava-streams also overflow down to the virgin forests clothing the eastern slopes facing the Amazons basin. Stübel assures us that the Indians of Macas see these rivers of fire for years together lighting up the western horizon during the night. The earthquake which destroyed Riobamba in 1797 is said to have been propagated from beneath Sangay.

South of this volcano the Eastern Cordillera, though interrupted by the valley of the Rio Paute, is still dominated by a few lofty summits, such as Quinoaloma and, farther on, the mountains with which is connected the transverse Azuay or Pucaloma ridge. It was recently supposed, on the authority of Humboldt, that no volcanic formations occurred farther south than this group, and that the mountains of the surrounding region consisted of sedimentary rocks. But such is not the case. Reiss and Wolf have determined the existence of old

volcanoes, which stand, not on the edge of the plateau, as elsewhere in Ecuador, but in the very heart of the inter-Andean region.

Azuay itself represents one of these igneous groups; another rises farther east near Cuenca, and a third more to the south towards the sources of the Rio Jubones. Although their outlines are so far effaced that regular cones and craters can no longer be recognised, their eruptive origin is still attested by the surrounding lava-fields.

Eastwards the cordillera offers nothing but crystalline schists, some few of whose summits penetrate to the lower limit of perennial snows. Beyond the mountain mass which sends its running waters eastwards to the Rio Paute, and the centre of which is occupied by the town of Loja, the Andean system contracts to a single range trending southwards between the upland Peruvian valleys on the west, and those draining to the upper Marañon on the east. Here is developed the upper bend of the great river within 200 miles of the Pacific seaboard, so that in this district the cordillera is reduced to little more than a narrow ridge forming the link between the Ecuadorean and the Peruvian Andes. The ridge itself, decreasing in height in proportion to its contracted width, falls to an altitude of scarcely 6,500 feet above sea-level.

Pichincha—Corazon—Illiniza.

South of the deep Guallabamba valley follows Pululagua, an igneous cone, standing not on the summit of a mountain, but on the flank of the cordillera itself. Pichincha, the first volcano of the western range, is the famous mountain at whose base lies the city of Quito. Since La Condamine's expedition of 1742 numerous explorers have visited Pichincha, which is of extremely easy ascent, its broad flanks, with their grassy approaches, sloping so gently that riders are able to reach a height of 13,800 feet before dismounting. Yet this volcano is still but imperfectly known, and the number of peaks and craters, as well as their height and respective dimensions, continue to be subjects of dispute.

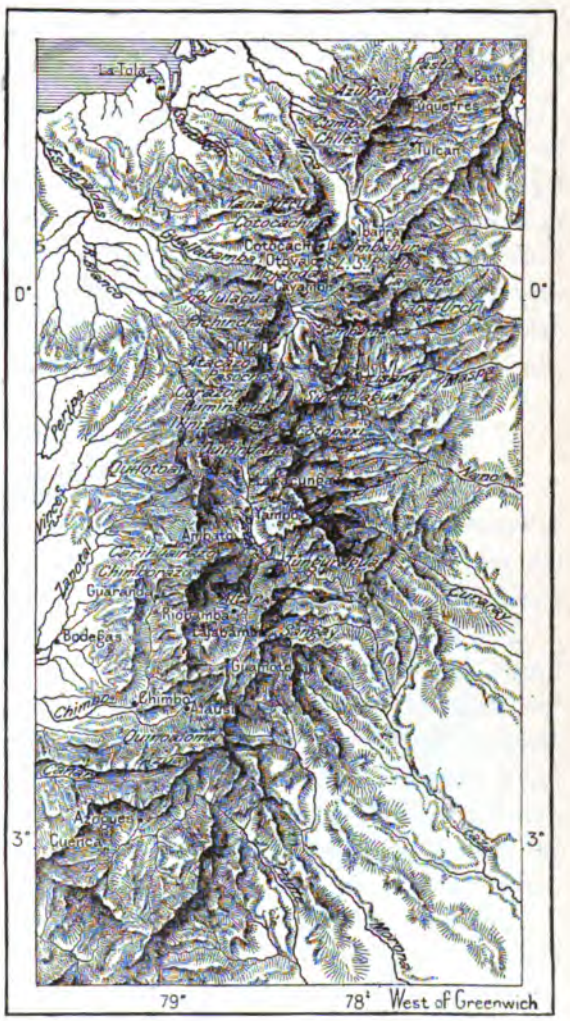
A feeling of local pride has inspired certain inflated descriptions, in which the reader finds it difficult to draw the line between truth and exaggeration. But Guagua (the "Young"), loftiest of the two chief peaks, appears to have certainly increased in height during the historic period, outstripping Rucu (the "Old"), and the three other peaks. Pichincha, whose Quichua name has the meaning of "Boiling Mountain," has been the scene of violent explosions, although since 1660 it has ejected nothing but steam, accompanied by some ashes. The principal crater, which has a very wide breach on its west side, is one of the deepest known, the pipe being variously estimated at 2,540 and 2,860 feet. At the bottom are still seen some solfataras and smoking crevasses, while a stream, well named the Rio del Volcan, descends from the breached crater across the wooded slopes in the direction of the Rios Toachi and Esmeraldas.

South of Pichincha follow in a straight line Atacazo, Corazon, and Illiniza, the first a regular cone, with gentle slope falling below the snow-line. Corazon, in which popular fancy detects the form of a "heart," is both higher and of

more difficult access, terminating in a nearly vertical wall about 820 feet high, which has to be scaled by clambering up narrow gorges excavated by the rains and avalanches. La Condamine and Bouguer resided twenty-two days on Corazon, ascending to the summit, which was long supposed to be the highest elevation reached by man. The terminal *caldera* ("cauldron") is the deepest yet discovered in the Andes, 3,950 feet, according to Reiss's measurement.

Fig. 88.—Double Chain of Ecuadorean Volcanoes.

Scale 1 : 4,500,000.



Illiniza, with its twin ice-capped peaks, is nearly always wrapped in mist, so that a clear vista is seldom obtained. Whymper, who passed seventy-eight days in the neighbourhood, never got more than a partial view, or a short glimpse of the summit. He tried to clamber to the top, on all fours, so to say, but had to give up the attempt, being intercepted by huge *séracs*,* some of which showed clean walls of ice, apparently 200 feet high, lurching forward as if ready to fall, and separated by crevasses from 20 to 25 feet across.

Farther south rises Quilotoa, whose crater is flooded by a tarn at a temperature of 61° Fahr. or 14° above the surrounding atmosphere. According to Velasco, an eruption of lavas occurred in 1725, when flames were seen to shoot up from the middle of the lake.

Beyond Quilotoa follow other less elevated cones, bristling on the slopes of broad paramos, whence branches off south-westwards a third cordillera, with peaks scarcely lower than those of the main range.

* *Séracs* are the solid cubical blocks into which glaciers are sometimes broken, owing to steep gradients or other causes. The fragments are often separated by very large crevasses, rendering the ascent extremely difficult, if not altogether impossible.—Ed.

The Ecuadorean Coast Ranges.

The pass followed by the road from Guayaquil to Chimborazo attains a height of 10,420 feet where it crosses this "Pacific Range of Ecuador," as Whymper calls it, that is, Wolf's "Cordillera of Chimbo." In its culminating peak, Pumin, this range reaches an altitude of 11,500 feet; but farther on the crest falls rapidly, terminating in the steep cliff on the banks of the Rio Chimbo, which reaches the coast at Guayaquil Bay.

East of the Rio Daule, which joins the Chimbo in the Guayaquil estuary, a few small coast ranges and groups attain altitudes of 1,000 or 2,000 feet. The so-called Cordillera de Colonche, highest of these ridges, exceeds 2,450 feet, and ramifies eastwards in the Cordillera de Chongon, which projects as far as the Rio Guayas. The system is even continued beyond the estuary by a rocky islet, and some eminences rising just above Guayaquil, on the left bank of the Chimbo. Chanduy, southernmost member of this group, although only 1,000 feet high, is lofty enough to intercept the southern breezes, and deflect them towards Guayaquil, where they are locally known as the Chanduy winds.

Chimborazo—Carihuairazo—Table of Altitudes.

In Ecuador the last snowy peak is Chimborazo, that is, the "Chimbo Snows," so named from the western valley, whence the ascent is made to its glaciers. On the east side the corresponding name was Urcu-Razu ("Snowmount"), already mentioned under a slightly different form by Cieza de Leon.

This giant of the Ecuadorean Andes develops its rounded crest above a rugged mountain mass flanked by two superb buttresses, the Igualata volcano on the east, and on the north the extinct Carihuairazo, often called Chimborazo Hembra, the "Woman," as if regarded by the popular fancy as the mate of its taller neighbour. Yet according to a somewhat doubtful tradition, Carihuairazo exceeded Chimborazo in altitude down to the end of the sixteenth century, when its summit collapsed during an earthquake, leaving the two fragments now covered with snow.

But whatever truth may be veiled by this legend, Chimborazo at present overtops Carihuairazo by about 5,000 feet. It was undoubtedly the scene of former eruptions, although no reference is made to them by the chroniclers, or even by any local traditions. The crater, if it still exists, is entirely buried beneath the deep snows and the glaciers radiating from the summit. Even the lava-streams that must have once flowed down its flanks can no longer be detected, while the original regularity of the cone has been effaced by the tremendous cataclysm which carried off a portion of the mountain, leaving those enormous and inaccessible walls which now rise above the lower ice-cliffs.

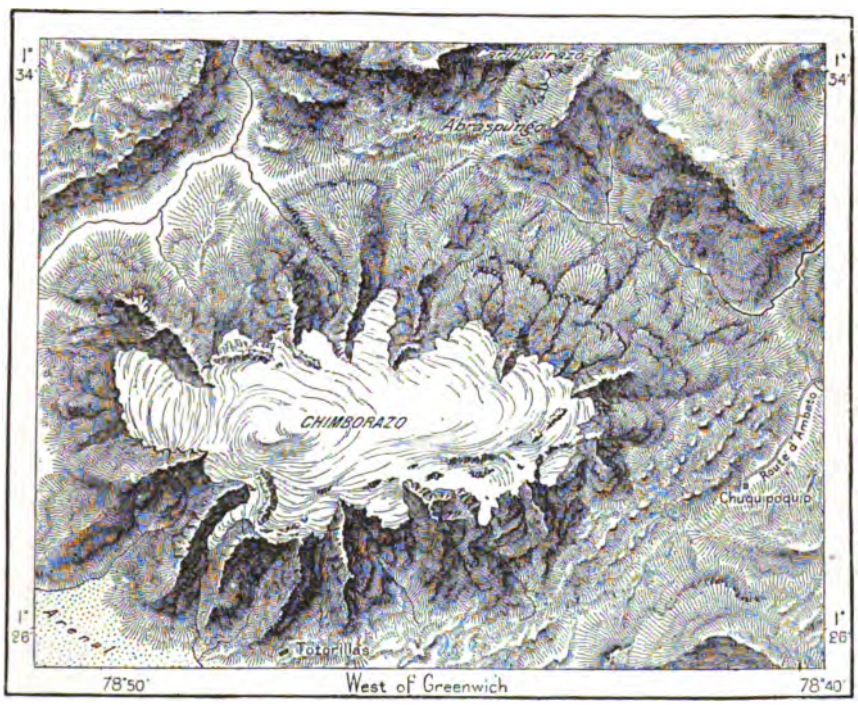
Boussingault's hypothesis, that the entire mass of fractured trachytes was bodily displaced, has not yet been confirmed by the observations of subsequent explorers. The walls still standing are formed by innumerable strata of diverse

colours—grey, black, red, and yellow, evidently representing so many layers of lavas deposited by successive eruptions. The fragments detached from time to time by the avalanches are of such a texture as to leave no doubt on this point.

All the upper combes round the terminal domes discharge glaciers, which have been named by Whymper after the explorers who had most contributed to the study of the orography of the Andes. Humboldt, Boussingault, and Hall failed in their attempts to reach the top, which may possibly have been scaled in 1856 by Jules Remy during a snowstorm which prevented him from recognising

Fig. 89.—Chimborazo.

Scale 1 : 200,000.



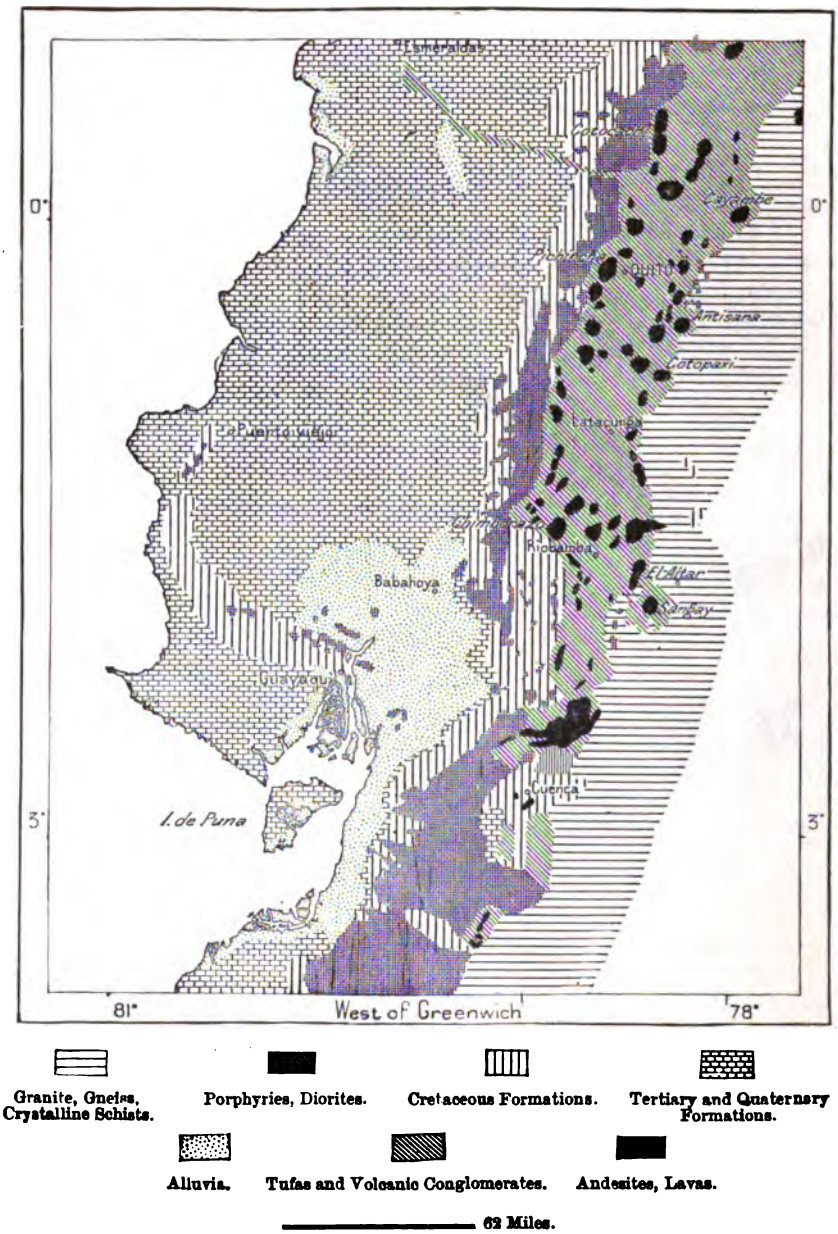
the positions, though not from measuring the altitude by the boiling-water process. From the highest point, ascended by Whymper in 1879 and again in 1880, a view is commanded of all the volcanoes forming the Ecuadorean "avenue," as well as of the western Pacific range, with its peaks, its passes, and valleys, and, beyond the intervening woodlands, the broad expanse of the ocean 200 miles off. During the second ascent Whymper and his companions encamped on the upper snows, while the atmosphere was filled with a cloud of ashes ejected by Cotopaxi 60 miles away to the north-west.

Southwards the porphyritic range decreases in height, and is successively

pierced by the valleys of the Rios Chanchan, Cañar, and Jubones. Beyond the first short section, Chilchil, more like an isolated group than a range, the crest

Fig. 90.—Geological Formation of Ecuador.

Scale 1 : 4,000,000.



is developed in a long curve of paramos, which is crossed at the Cajas pass (13,570 feet). Beyond the Rio Jubones the cordillera loses all regularity, and, under the name of Chilla, takes a trend transverse to its primitive axis, to merge in

the Eastern Cordillera at the Loja Knot; the whole Ecuadorean system thus passes in a single ridge into Peruvian territory.

Since the time of La Condamine and his associates, the altitudes of the heights and cities of Ecuador have frequently been measured, but nearly always with varying results. Even the first observers recorded figures for Chimborazo with discrepancies of over 1,000 feet. Hence it would be premature to base any geological hypotheses on the growth or decrease of the igneous cones of Ecuador during modern times. There are altogether as many as twenty-two summits which at present penetrate above the zone of perpetual snows. Subjoined are the estimates of Reiss and Stübel and of Whymper for some of the more important altitudes:—

	Reiss and Stübel. Feet.	Whymper. Feet.
Chimborazo	20,703	20,498
Cotopaxi	19,498	19,613
Cayambe	19,161	19,186
Antisana	18,885	19,335
Altar	17,736	—
Sangay	17,460	—
Illiniza	17,400	—
Carihuairazo	16,752	16,515
Tunguragua	16,700	—
Cotocachi	16,293	16,301
Corazon	15,801	15,871
Pichincha	15,706	15,918
Sara-Urcu	15,749	15,502
City of Quito	9,350	—

III.

Hydrography of Ecuador.

Despite an abundant rainfall, springs and running waters are rare in the volcanic region of Ecuador. In the loose scoriæ and ashes covering much of the surface the moisture disappears as soon as precipitated, and infiltrates to great depths, reappearing at the crater mouths under the form of vapours. Even thermal springs, usually occurring in hundreds in volcanic regions, are absent in Ecuador. Whymper mentions one only near Machachi, between Cotopaxi and Corazon, although the native geographers speak of several others at the base of the Illiniza, on the Tunguragua slopes and elsewhere.

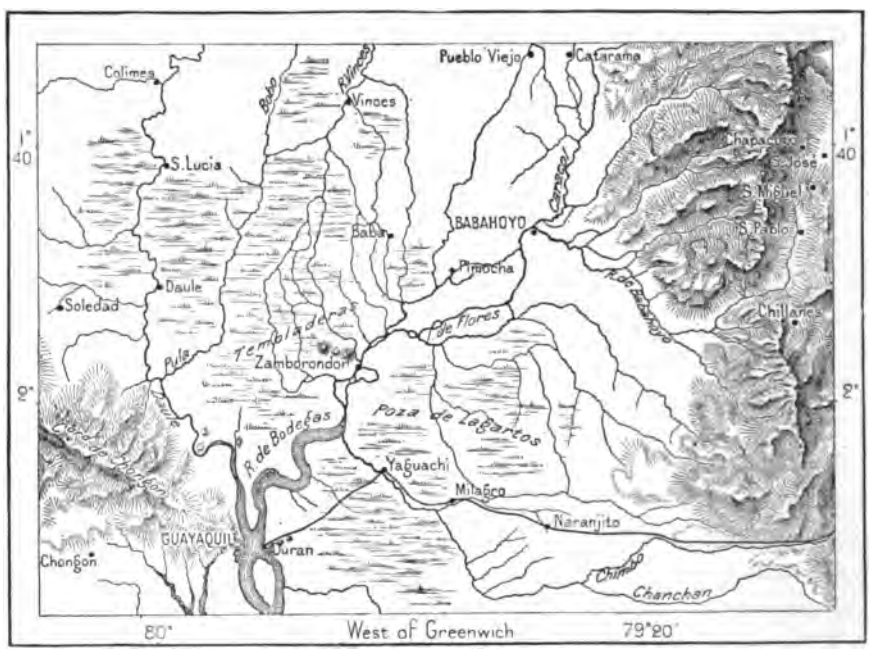
Being fed by no springs about their sources, the rivers developed on the plateaux are of slight volume, and are scarcely affected even by copious rains. But beyond the region of ashes and pumice, where the surface waters disappear as in a sieve, the streams flowing in less spongy beds increase rapidly in volume, many assuming the aspect of real rivers before reaching the coast. Such is the Guallabamba, which, after leaving the plain of Quito, passes into a frightful gorge, 2,000 feet deep, at the foot of the Mojanda volcano. Joined by the Toachi, it forms the Chinto (Perucho or Esmeraldas, "Emerald River"), a navigable stream, but little utilised, owing to the absence of riverine popula-

tions. According to Teodoro Wolf, the Rio Esmeraldas has a drainage area of 8,500 square miles.

A few small coast-streams follow southwards as far as the deep inlet at the head of which debouches the copious Rio Guayas, which gives its name to the port of Guayaquil. The Babahoyo, its chief headstream, rises in the Pacific coast range, and, after collecting numerous tributaries on both sides, assumes the proportions of a considerable river below the so-called *bodegas*, or "stores," at the landing-stages, where travellers start for the ascent of the plateau. Even before its junction with the Yaguachi or Chimbo, which collects the running waters from the Chimbo heights, fed by the Chimborazo and Chanchan glaciers, the Baba-

Fig. 91.—Confluence of the Guayaquil Rivers.

Scale 1 : 1,000,000.



hoyo is a large stream, 2,000 feet wide from bank to bank. Lower down it is joined on its right side by the Rio Daule, which, after emerging from an extensive forest region, winds through a low-lying plain between *pajonales* ("savannas") and *tembladeras* ("quagmires"), expanding to a width of over half a mile as it enters the Guayaquil estuary. This marine inlet, which is here called the Rio Guayas, rapidly broadens out to a width of over a mile at the town of Guayaquil, beyond which it ramifies through a small archipelago and round the large island of Puna at the entrance of the gulf. The Guayas catchment basin has an area estimated by Wolf at 14,000 square miles.

On the Amazonian slope the copious rains, intercepted by the dense vege-

tation even along tolerably steep inclines, transforms its surface to a veritable sponge, like the turf bogs of the Irish mountains. Here the matted arborescent growths are in some districts replaced by grasses or, rather, sharp-pointed reeds (*chusquea aristata*), forming almost impenetrable masses of an average height of about 10 feet. In order to make any progress the wayfarer has to brush them aside with both arms, as in the act of swimming, pressing with the whole weight of his body on these herbaceous waves.

The spongy chusquea savannas peculiar to Ecuador are succeeded by rugged

Fig. 92.—Tunguragua and Pastaza Gorge.

Scale 1 : 900,000.

heights, swift streams, and woodlands festooned with the endless coils of lianas, the dangers, hardships, risks of sickness and death increasing with every step. One reads with astonishment that Gonzalo Pizarro was able to bring back alive even eighty of his followers from his memorable expedition of 1540 to the "Land of Cinnamon," as it was called. On emerging from these wild Andine valleys, the watercourses forming the Napo, Pastaza, Paute, and even the affluents of these Amazonian streams, are already copious rivers difficult to cross.

The Napo, formerly Naapo, fed by the snows of Antisana and Cotopaxi,

receives two great tributaries in Ecuador, the Coca from the north and the Curaray from the south. To judge from the trend of the main valley, disposed in the direction from north-west to south-east, the Coca should be regarded as the chief artery. But the Napo, thanks to its vicinity to Quito, retains its name below the confluence all the way to the Amazons. The traders and missionaries also have usually followed the course of this river, which during the present century has been preferred by most travellers and explorers. Wiener ascended the Napo as far as Misahualli, eight days' march from Quito. At this point the channel has still an average depth of 6 or 7 feet.

The Pastaza draws some of its supplies from the region of the Ecuadorean volcanoes. Such is the Patate, which, after receiving some contributions from Chimborazo and Cotopaxi, flows due north and south across the plain of Ambato, beyond which it turns the southern spurs of Llanganati, and suddenly plunges into a chasm 160 feet deep eroded in the thickness of a lava-stream. At the outlet of this gorge the Patate is joined by the Chambo from the south, and just below the confluence the Pastaza, or Agoyan, as the united stream is also called, trends round to the east along the northern foot of Tunguragua. Farther on it plunges a height of 200 feet into a gorge 5,000 feet above sea-level, where the exuberant vegetation of tropical nature already begins to flourish.

Of all the rivers on the Atlantic slope of South America, the Paute, which rises in the Cuenca basin, has its source nearest to the Pacific Ocean. From its farthest headstream to the shores of the Gulf of Guayaquil the distance in a straight line is not more than 34 miles.

IV.

Climate of Ecuador.

Like Colombia, Ecuador presents a succession of all climates superimposed on the flanks of the highlands. Each of the three physical zones—ante-Andean, inter-Andean, and trans-Andean—has its special climatic features, and in each the atmospheric relations are modified by altitude, aspect, and relative proximity to the ocean. Were Ecuador deprived of its uplands it would be essentially a torrid region, whereas for most of its inhabitants it is a temperate, almost even a cold land, where the snows and glaciers on the mountain summits sparkle beneath the sun at its zenith.

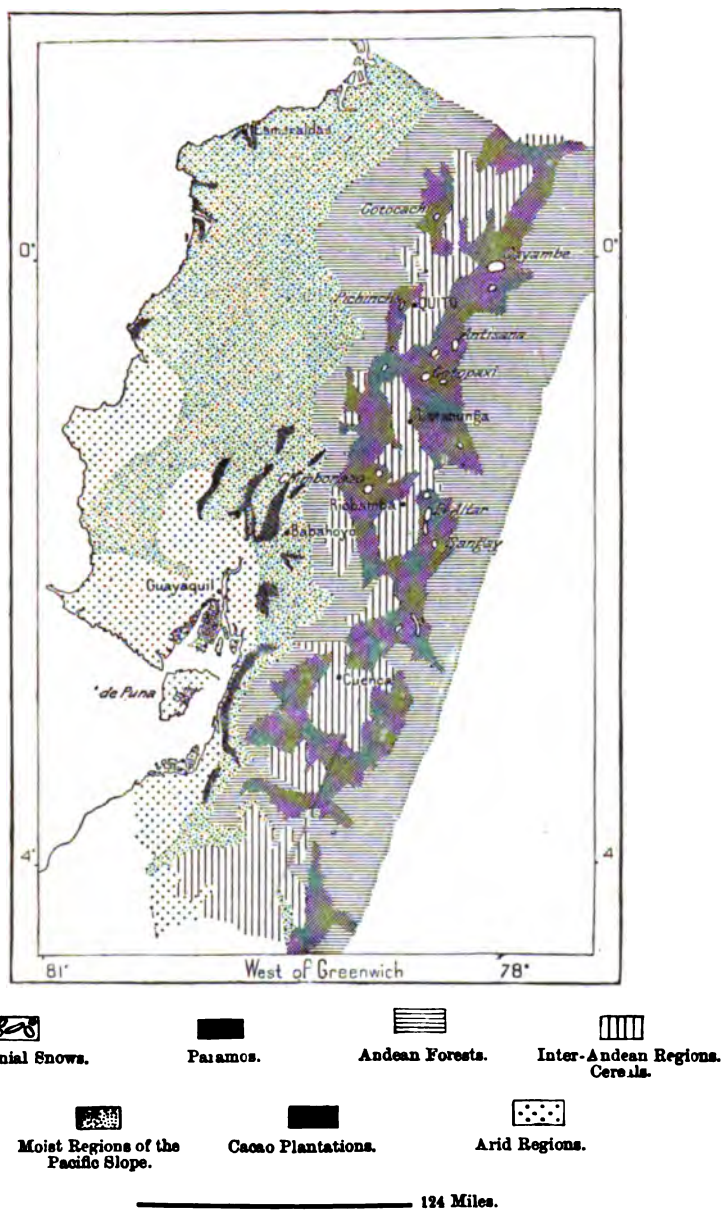
On the projecting coastlands of the province of Manabi the climate is cooled by the coast stream; here the mean temperature of the sea is not more than 73° or 74° Fahr., whereas farther north, in the sheltered waters of Esmeraldas, it rises to 83°. Along these shores the local winds blow chiefly from the west in the northern, and from the south in the southern sections.

Although protected from the normal winds by the double and triple barrier of the Andes, the Ecuadorean seaboard is subject to the rhythmical succession of tropical seasons. From June to December, Guayaquil enjoys a so-called

"summer," when the air is drier than during the rest of the year, while the land and sea breezes alternate pleasantly, dispersing both the mosquitos and the marshy exhalations. Then follows the "winter," or rainy season, with its fierce heats

Fig. 93.—Rainfall and Forests of Ecuador.

Scale 1 : 5,500,000.



during the day, its storms at evening and at night, its downpours, destructive floods, swarms of pestiferous insects, and often its epidemics.

On the inter-Andean uplands the alternation of seasons is half effaced by the

effects of the east winds bringing their regular burden of rains and vapours to the eastern slopes of both cordilleras. Summits like those of Sara-Urcu and Illiniza, which lie near the aërial regions of conflicting clouds, are nearly always shrouded in dense aqueous vapours; the observer may reside months together at their foot without obtaining a single glimpse of their crests. "The mountain lives thus during the whole year," replied a native to the geologist Stübel asking whether the veil of clouds would presently be rent.

In those upper combes storms are very frequent, and often accompanied by hail. At Quito the stormy days average as many as three hundred in the year. Usually the sky remains longest free from clouds at the epoch of the solstices, in July and December; consequently during those months explorers have the best chance of successfully scaling the snowy heights. At all other times the evening storms recur so regularly that preparation is made for them, as for the return of astronomic phenomena. The blue sky generally lasts till one or two o'clock, after which the vapours begin to rise, the clouds bank up on the horizon and then discharge their torrential downpours. Towards six o'clock nature resumes its peaceful mood.*

Flora.

The two cis-Andean and trans-Andean forest zones of Ecuador rival those of Brazil itself in richness and variety. In fact, the thickets traversed by the tracks descending to the Napo and the Pastaza valleys are mere extensions of the great Amazonian woodlands. The Ecuadorean forests have already yielded several valuable species, and hold many others in reserve. It was in the province of Esmeraldas that La Condamine procured from the natives the first samples of caoutchouc gums ever sent to Europe.

The first barks reduced to febrifugal powders by the European chemists were those of *cinchona macrocalyx* and *cinchona pubescens*, which in the seventeenth century were procured exclusively in the Ecuadorean forests of Loja and surrounding districts. The efficacy of the bark of cinchona, *arbol de calenturas*, the "fever tree," was well known to the natives when Juan de Vega ventured to use it in 1638 to cure the *chuchu*, or endemic ague contracted by the Countess de Chinchon. Henceforth the *polvos de la condesa* ("countess's powders"), later called "Jesuit's powders," "Jesuit's bark," or "Peruvian bark," entered into the European pharmacopœia.

The *ratanhia*, much used in the case of dysentery and hæmorrhages, was also a member of the Ecuadorean flora. The "cinnamon" discovered by Gonzalo Pizarro in the eastern forests is a *nectandra*, one species of which yields the

* Meteorological conditions of Ecuador:—

	Altitude. Feet.	Mean Temperature.	Extremes of Heat.	Extremes of Cold.	Rainfall. Inches.
Guayaquil . . .	33	79° F.			
Quito	9,350	56° F.	79° F.	45° F.	47
Cuenca . . .	9,470	58° F.			

so-called "cinnamon of Santa Fé." Another tree growing in the same region produces copal, and the upper Rio Mira basin is the home of the false pepper (*schinus molle*) which has become so common round the Mediterranean seaboard.

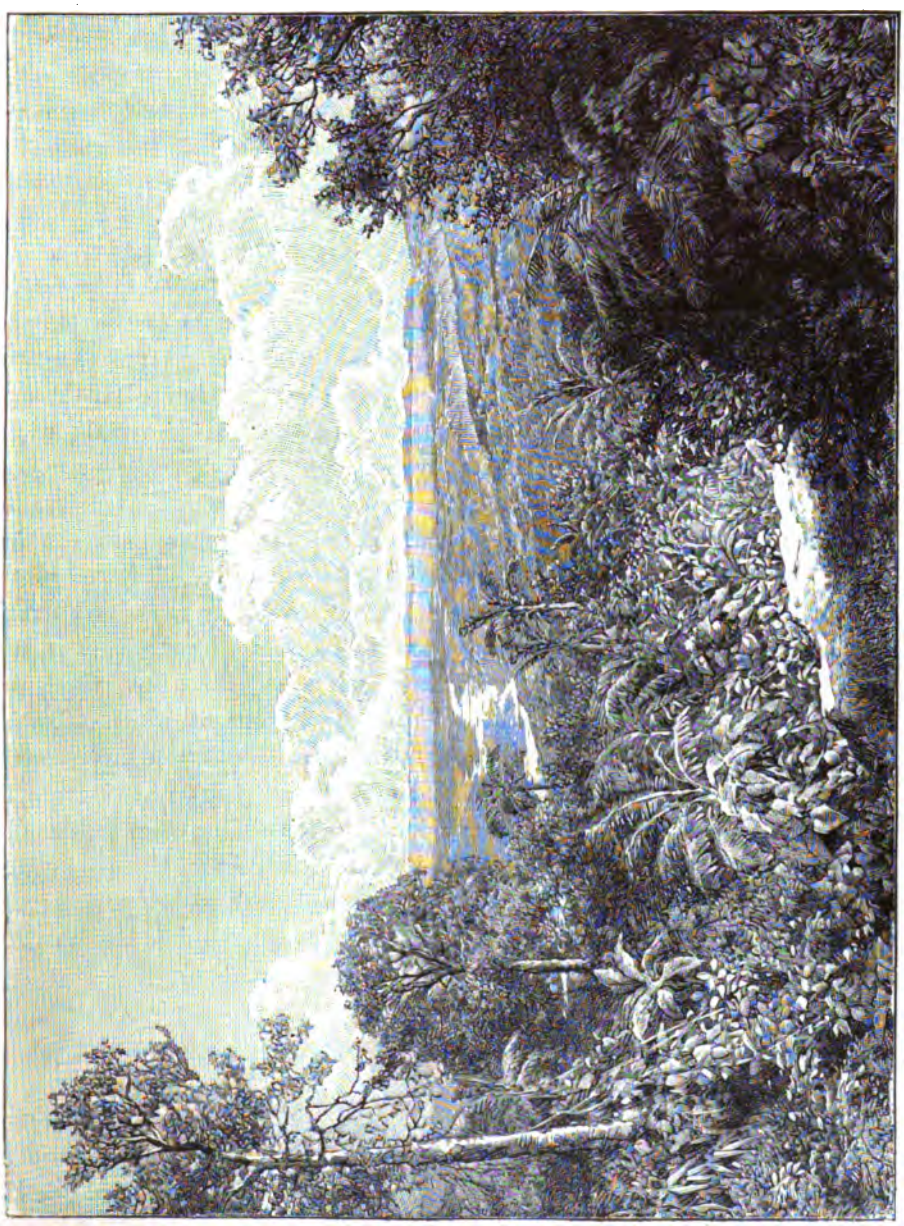


Fig. 94.—Ecuador Scenery; View taken on the Banks of the Pastaza east of Altar.

The Quitonians also possess the *guayusa*, a kind of "tea," which grows spontaneously in dense thickets on the slopes of Pichincha and other mountains.

In the Ecuadorean Andes the upper limit of arborescent vegetation attains an altitude of 11,800 feet above sea-level. But many vast spaces comprised within

this zone are absolutely treeless, despite a superabundant rainfall. Thus the volcanic uplands of the Quito and Riobamba basins have no trees except willows (*capuli*) or wild cherries (*rhamnus humboldtiana*), fringing the river-banks. On the sandy Riobamba plain nothing is seen except agaves, euphorbiæ, Barbary figs, and other cactuses, besides a species of reed known by the Quichua name of *sigsig* (*arundo nitida*).

Even far below the plateau, in the Guallabamba gorge, trees are absent, which is to be attributed, not to the climate, but to the loose volcanic ground, where the rain waters rapidly disappear. But forest growths recover their exuberance and variety in the regions of more tenacious soil, on the eastern slopes of both Cordilleras, and farther south on the Loja plateau, where the woodlands of the seaboard are continuous across the Cordillera with those of the Amazons basin. Here botanists have found the *condurango*, an asclepias formerly supposed to be a specific against cancer, and some rare species of orchids, which, thanks to the temperate climate of the Andes, are more easily acclimatised in the European conservatories than those of Brazil. On the seaboard vast spaces, lying to leeward of the mountain ranges, and consequently cut off from the moist trade winds, remain arid and unproductive, despite their naturally fertile soil.

The *polylepis*, dwarf trees with twisted boughs and roots and birch-like bark, which occur here and there on the slopes, range far higher than the forest growths; André met one on Chimborazo at an altitude of 13,860 feet. In those districts where the shrubs have been fired, they are invariably replaced by various herbaceous plants (*stipa, andropogon, paspalmum*) comprised by the Indians under the general name of *ichu*. Farther up nothing is seen except low, vivid green growths, such as the woolly-leafed *culcitium*, one variety of which (*C. nivale*) flourishes in the very midst of the snows. Certain flowering plants reach the neighbourhood of the snow-line, which is estimated at about 15,750 feet; they even occur as high as 16,200 feet, though nowhere presenting those brilliant hues which are so admired in the flora of the European Alps. At an altitude of 18,500 feet Whymper still met patches of a lichen (*lecanora subfusca*), probably "the greatest elevation at which anything appertaining to the vegetable kingdom has been found in either of the Americas" (page 76).

Fauna.

Taken as a whole the Ecuadorean fauna differs in no respect from those of the conterminous regions of Colombia and Peru. Southern species absent from the northern Andes range as far as Ecuador, although the llama, "camel" of Peru, reaches no farther north than Riobamba. In most other districts it has been replaced by the mule as a pack-animal. The condor hovers over the Quito plateaux, as well as over the Peruvian and Bolivian mountains. But Humboldt was mistaken in supposing that it soars above the loftiest summits of the Andes, and that, by a remarkable power of adaptation to the environment, it finds itself equally at home in the neighbourhood of the sea and in the upper aerial spaces,

where the atmosphere has already lost half of its weight. If the Chilian condor descends to the coast, its congener of the Ecuadorean Andes is scarcely seen below 8,850 feet, and even dies if brought in captivity down to the sea.

On the other hand Whymper never met the condor higher than 15,000 feet; it hovers over the pastures usually at about 1,500 feet from the ground, maintaining itself by nearly imperceptible movements of the wing, and scarcely ever attacking any but young animals or those enfeebled by age, calves, old horses and the like.

The eastern forests harbour a great variety of birds, which have mostly a very limited range, often depending for their existence on a single species of flower or fruit. Most of the humming-birds, even on the uplands, are thus confined to very small areas. Wagner mentions one species which occurs only at the altitude of 13,780 feet on the slopes of Pichincha, while a closely related variety is found only on Chimborazo between the same altitude and the lower limit of perpetual snow. An ibis (*theristicus caudatus*) is the characteristic bird of Antisana, and the *flautero* ("flute-player"), endowed with a marvellously correct musical note, is restricted to the eastern forests.

The habits of various species have also been modified by their different environments. Thus on the Amazonian slope of the Rio Napo the bananas of Baeza, planted at an elevation of 7,880 feet at the foot of cliffs well exposed to the solar heat, suffer much from the ravages of a vampire (*thyroptera bicolor*), which penetrates into the terminal flower and absorbs its sap.* The chief obstacle to the settlement of the Amazonian slope is the multitude of bats (*phylostoma spectrum*), which attack both man and beast. Many of the children die of exhaustion from the attacks made on them while asleep by these blood-sucking vampires. In these eastern forests the reptiles are represented by innumerable species of snakes, which, however, are nowhere met higher than about 13,000 feet on the plateaux.

The originality of the local fauna appears especially in the lower organisms, notably the insects, most of which are also confined to very narrow ranges, several being found only on certain mountains. Whymper discovered on Pichincha no less than twenty-one new species of beetles, eight of which have been met nowhere else. Ecuador has altogether as many as 8,000 known species of coleoptera. The *colias alticola* butterfly flits upwards to the neighbourhood of the snow-line, although never seen on the lower slopes of the mountains.

On the plateaux the streams and meres at the great altitude of 14,600 feet present only a single species of fish, the preñadilla (*pimelodes* or *cyclopium cyclopum*). The natives, no doubt, speak of others inhabiting the upland basins, but naturalists have hitherto failed to discover them. Even the reports current on the subject of the preñadilla, accepted in good faith by Humboldt, have been questioned by recent zoologists. They are said especially to inhabit the deep waters concealed in the cavities of the volcanoes, and during the eruptions of Imbabura ("Fish Mountain") in 1691, of Carihuairazo in 1698, and of Tunguragua in 1797, myriads are

* Alfred Simson, *Travels in the Wilds of Ecuador.*

stated to have been ejected with the mud and slush, the stench from their putrid bodies spreading dangerous fevers far and wide.

The seas, especially about the estuaries along the north coast near Colombia, abound in animal life. One species, large shoals of which frequent Pailon Bay and the Sardines archipelago, is the famous "musical fish," first described by Onffroy de Thoron; it is distinguished from the *grondin* and all other singing-fishes by a peculiar note "well sustained, prolonged and harmonious." The same waters are infested by the *manta*, another curious marine animal, much dreaded by sailors. According to De Thoron's description it has no fins, but two arms, with elbows of almost human shape, and seizes the floating seaweeds on which it feeds with its "palmed hands."

V.

Inhabitants.

In Ecuador proper the aborigines have disappeared, or have been merged in the conquering races of pre-Columbian times, and afterwards slightly modified by crossings with the Spaniards. The Caras, Cañars and Quitus, formerly dominant on the plateau and western slopes, had originally come from the south. In Ecuador they intermingled with the indigenous peoples, who perhaps belonged to the same ethnical stock, as may be inferred from the generally current Quito language, a dialect of the Peruvian Quichua. According to a native chronicler, quoted by the Spanish historians, all the subjects of the Incas were required to speak the language of the conquerors, and this injunction was everywhere complied with. But such conformity, even if it were possible, would of itself imply a certain affinity between all these forms of speech.

Quichua tradition spoke of a race of "giants" who inhabited the forests of the seaboard, and whose remains, probably those of mastodons, are supposed still to be met with. The term "giant" itself, given to these aborigines, may perhaps be explained by the stout resistance they offered to the Quichua invaders. A powerful nation dwelling north of the Guayaquil peninsula, between the Rio Daule and the sea, bore the Peruvian designation of Huanca-Vilca ("Break-Teeth"), from the custom of the men to extract two of the upper incisors. The Inca, Huayna-Capac, is said after the Conquest to have condemned them to extract two others.

Under the Spanish rule the Cara tribes of the coastlands all became merged in the general population, except a few Colorado families of the upper Rio Toachi, and about 2,000 Cayapas, who still keep to the forests on the banks of the Rio Cayapa, holding carefully aloof both from the whites and the negroes. Wolf has collected a vocabulary of their language, which has also remained unaffected by Quichua or Spanish influences. In the inter-Andean districts all the aborigines have been similarly merged in the half-caste population of Quichua speech; a few Cañar families alone still survive near Zaraguro.

But while most of the Indians have lost the memory of their origin, numerous

huacas or *tolas* ("graves" or "barrows") have at least been discovered, and unfortunately eagerly rifled of their contents by treasure-seekers. Even the "Castles of the Incas," which had been erected in various parts of south Ecuador, have been systematically destroyed by the inhabitants of the neighbouring towns in the hope of finding gold, afterwards using them as convenient quarries. In several places archæologists have re-discovered sections of the highways laid down by the Incas; but they are not built with the same care as those of Peru itself, being, in fact, little more than tracks along which little posts or guard-houses were erected at long intervals.

In the eastern regions on the Amazonian slope, the uncivilised tribes are still reckoned by the dozen, or even by the hundred were account to be taken of all the ethnical names collected at various times by travellers, missionaries and administrators. But many of these designations often refer to one and the same group, at one time mentioned by its proper tribal name, at another by that given to it by its neighbours, or else by that of some river, mountain, or forest, or even by some nickname in allusion to personal peculiarities, habits or customs.

But despite their interminable nomenclature nearly all these Indians are thinly scattered, not in Ecuador proper, but in the Amazonian regions contested by Colombia, Peru or Brazil. Only a very small number dwell in undisputed Ecuadorean territory, and even these have representatives of their race beyond the frontiers. They form two social and political groups—reduced and "salt-eating" Indians, and *Infieles* ("Infidels"), called also *Aucas*, a term formerly applied by the Quichuas to the independent populations, such as the Orejones, Encabellados and others who made no use of salt.

Most famous of these rude tribes were the Jivaros (Xibaros, Gibaros), who were formerly grouped in several stations round about the missions. The ruins of churches on the banks of the Paute and of the Santiago, in south-east Ecuador, still recall the time of their complete subjection to the authorities. But towards the close of the sixteenth century they rose in mass under their chief, Quirruba, and massacred the whites, sparing the women alone.

Since then, driven eastwards by the planters from the Loja plateau, they have roamed the forests between the Pastaza gorges and the Pongo de Manseriche. Till recently they were reported to be very numerous; according to one account as many as 500,000, distributed in 400 tribal groups, and capable of mustering 150,000 armed warriors. But in reality they probably number less than one-hundredth of the latter figure.

The Jivaros, whose speech is absolutely distinct from the Quichua, and who have been affiliated by D'Orbigny, Hamy and other anthropologists to the great Guarani family, are a fine race, living on the produce of the chase, of fishing, and their swine. Proud of their personal appearance, they embellish themselves with paint, usually red on a black ground, with plumes, bead necklaces, and bits of reed inserted in their ear-lobe. They are distinguished from most other wild tribes by their industrious habits, occupying nearly all the time spared

from fishing and the chase in tilling the land and manufacturing diverse useful objects.

They dwell in large houses where each family has its separate "suite"; but those addicted to polygamy live apart, some even keeping their women in jealous seclusion, after the Eastern fashion. The warriors practise a kind of telephonic art by means of the *tundili* (drum), whose rattle reverberates from hill to hill. They show remarkable skill in preserving the skin of the enemy's head, which is shrunk by a drying process without undergoing any modification of form. As men of honour, they allow their hair to grow in long tresses, in order to enable the foe the more easily to seize and strike off the highly-prized trophy of their heads.

All ailments and accidents are attributed to magic, to the influence of the evil eye, to the charms of some wizard disguised as a snake or jaguar, to the dart of some invisible agency. On the least suspicion, the head of the family throws himself into a state of frenzy by drinking the juice of a narcotic plant, and devotes to death whoever has been revealed in his vision as the author of the evil. Preparations are at once made to compass his destruction; no rest is known till the fancied injury is avenged, and the vendetta is thus transmitted from family to family, from tribe to tribe.

Those aborigines of the lower Napo who have preserved their independence, while keeping up peaceful relations with the *viracochas* ("whites"), belong for the most part to the Zaparo and Piojé nations. The Zaparos, or "Panniers," so called from the waterproof hampers they make of wickered lianas, speak a stock language noted for its harsh, guttural sounds. Divided into "two hundred" hostile groups, they live in a constant state of inter-tribal feud, kidnapping their neighbours' women and children, pursuing and "bagging" each other like so much game. Bloodshed is their delight, and they are overjoyed at the prospect of a battle. They often kill their sick, either to get rid of useless mouths or through sheer love of cruelty.

Lower down the Napo dwell the Piojés, akin to the Piojés of the Putumayo basin, a much less warlike people than the Zaparos, and noted for their industrious habits. Excellent agriculturists, they devote the day to tillage, and often pass the night weaving and knitting hammocks keeping themselves awake with a decoction of *yoco*, a plant rich in caffeine. All these independent groups—Jivaros, Zaparos, Piojés—present in their manly bearing a marked contrast to the servile Napos and Quijos (Canelos), who live in settlements about the missions of the upper Napo region subject to the whites.

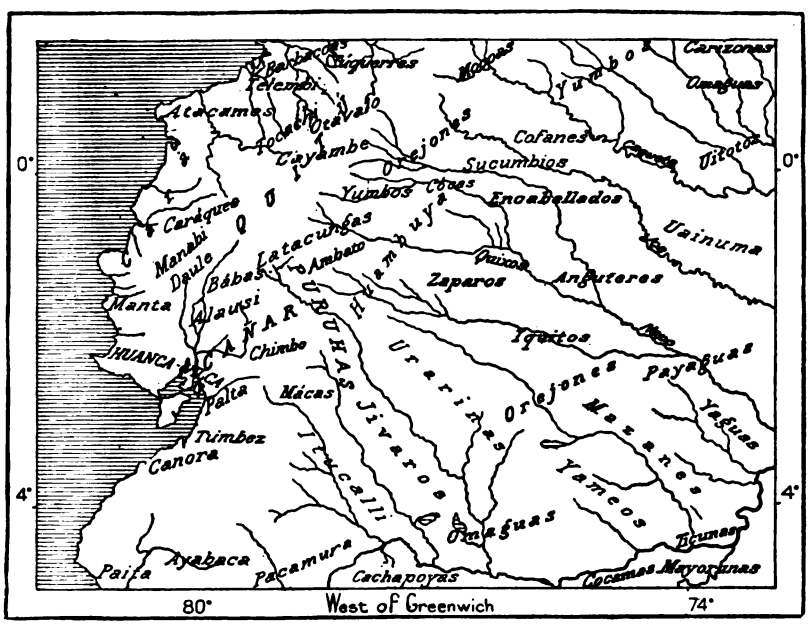
The mestizoes, who, however, have but a slight strain of Spanish blood, and who constitute the bulk of the inhabitants of Ecuador, appear to have preserved the character, habits and genius of their Quichua ancestry. Accustomed to dread the violence and oppression of their Inca and Spanish rulers, they still cringe before the white man, mistrusting even those who treat them with kindness. They never decline service, and are always full of promises, and seek by a thousand subterfuges to shirk work and deceive their masters. Their courtesy,

however, is genuine, being in fact inspired by fear. This timidity of character so common amongst the Ecuadoreans may perhaps be explained by the frequency and destructive force of the earthquakes. The frightful shocks, swallowing up whole cities, seem to them divine punishments for their sins. Hence they live in a state of perpetual terror, ever imploring the priests, saints and angels to plead for them.

In their fervent piety they worship the Catholic saints with the same faith as their former idols. The two religions, old and new, have been superimposed, and their supplications are equally addressed to all supernatural beings, gods and demons from whom they hope for mercy, or whose wrath they dread. In the

Fig. 95.—Indigenous Populations of Ecuador.

Scale 1 : 10,000,000.



picture of Michael Archangel overcoming the devil the Indian invokes both victor and vanquished, the latter possibly with the greater fervour, bringing him special offerings of wax tapers, flowers and garments.

As in Spain and as amongst the ancient Quichuas, the solemn processions have their masks, their mimes and dancers; they have also their voluntary martyrs, who lacerate themselves like the mediæval flagellants and the fakirs of India. Some of the devotees follow the crowd half naked, dragging along heavy beams fastened to their arms and shoulders by wire cords which cause the flesh to swell and the blood to spout. Others lash thorny fagots to their bodies, which at every step tear their limbs and leave a stream of blood in their wake. These penitents are known by the name of *chacatascas*.

Except during these days of frenzy and ecstasy the Ecuadoreans are a sad and sullen people. The features especially of the women seem haggard with care and biding misery. Some of their customs greatly shock visitors, and uncleanly habits prevail in this land of dust. Yet, despite their sordid surroundings the Quitonians appear to possess the sentiment of form and colour in the highest degree. Notwithstanding the rigid hieratic formulas and conventionalities to which the priests have enslaved them, many of the mestizoes and even of the full-blood Indians succeed in executing really remarkable religious paintings, as well as sculptures of Christs and Madonnas, works greatly admired in Peru and other South American countries, to which they are regularly exported. But the natives have lost one artistic industry, inlaid work in costly woods. It has also been noticed that neither his extreme poverty, nor the dull existence to which he is condemned, has prevented the Ecuadorean from distinguishing himself by the elegant cut and harmoniously-blended colours of his clothes.

VI.

Topography.

All the northern towns of Ecuador are comprised within the limits of the plateaux, which form a southern continuation of the Pasto uplands. *Tulcan*, guardian of the frontier near the Colombian Ipiales, owes its importance to its trade with the neighbouring republic. In this respect it serves as the depôt of the larger city of *Ibarra*, founded at the end of the sixteenth century on a plain whose waters flow northwards to the Rios Chota and Mira. The climate of Ibarra is much milder than that of Tulcan, thanks to its considerably lower altitude (13,200 and 15,830 feet respectively).

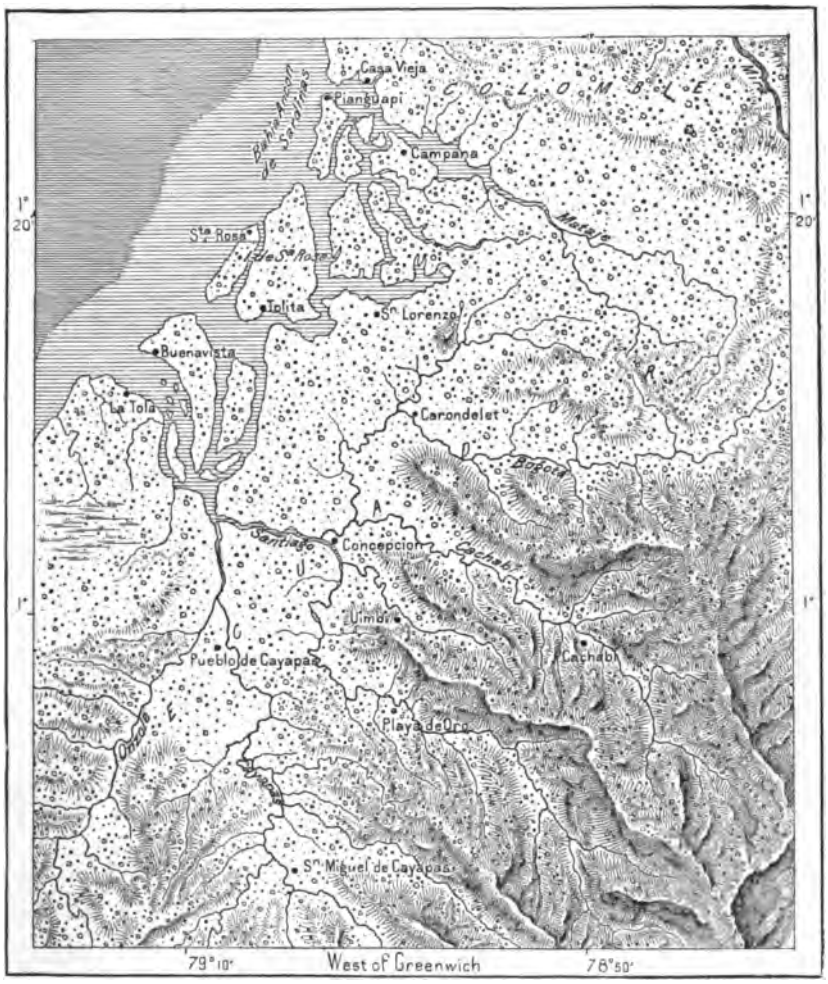
Ibarra lies in the heart of the historical region, and near it is shown the site of the ancient *Caranqui*, where stood a temple of the sun and a convent of vestals, and where was born Atahuallpa, done to death by Pizarro. The plain of Hatun-Taqui (the "Great Drum"), recalling the battle in which the Inca, Huayna-Capac, overcame the Caranqui Indians, slopes towards the deep, land-locked basin of Yaguar-Cocha ("Lake of Blood"), where the victor caused thousands—the legends say, "forty thousand"—of the vanquished to be butchered, dyeing crimson the vast sheet of water some ten miles in circumference. Over these plains are scattered hundreds of *tolas* (sepulchral mounds), from which the treasure-seekers have recovered many curious archæological objects.

Lying at the base of Imbabura, Ibarra was the scene of a frightful disaster in 1868, when nearly all its buildings were overthrown in a few seconds, burying 3,000 persons beneath the débris. The picturesque ruins of churches and convents are still seen, more beautiful in their drapery of flowers and verdure than when they left the builder's hands. *Otavalo*, lying south of the valley on the northern slopes of Yana-Urcu, suffered even more than Ibarra, losing nearly the whole of its 6,000 inhabitants.

But the violence of man has done even more than hostile nature to depopulate the land. The native settlement of *Pimampiro* had at one time a population of probably 11,000 civilised Indians, all of whom left in a body to escape the oppression of the Spaniards, descending to the eastern forests inhabited by the Sucumbio

Fig. 96.—Ancon de las Sardinas.

Scale 1 : 700,000.



tribe. In general the inhabitants of these uplands are extremely industrious, and the disasters of 1868 have already been more than repaired, so far as regards population, agriculture, and public wealth. The gold, silver and salt mines, however, are little worked; but the Indians of the lower Mira valley collect the

alluvial gold by an ingenious process acquired without any instruction from the Californian miners.

These marvellously fertile low-lying coastlands have for natural haven the *Ancon de las Sardinas*, with its deep harbour of *Pailon*, well sheltered by islands and headlands, and far better situated than Guayaquil for deep-sea navigation. It takes its name from the shoals of fish of all kinds to which the Spaniards give the general name of "sardines," and which are used both as food and manure.

Quito, city of the ancient Quitu nation, and present capital of Ecuador, follows south of Ibarra and Otavalo, along the line of Andean volcanoes. The urban population, variously estimated at from 25,000 to 40,000, was formerly much greater, when Quito was capital of one of the Quichua empires, and when under the Spanish rule it shared with Bogota the government of a vast colonial dependency, besides being the centre of the Jesuit missions scattered over the Amazons basin.

Quito, the city of perennial spring, with a climate whose temperature scarcely varies two degrees between the hottest and the coldest months, stands at an altitude of 9,350 feet on the last eastern slopes of Pichincha in a narrow basin bordered eastwards by the Poingasi ridge. Deep ravines, dividing the city into several sections, rapidly discharge the rain and sewer waters through a torrent to the Guallabamba affluent of the Pacific. Thanks to its steep incline, its channels, and the pure water drawn from Pichincha, Quito continues to enjoy a salubrious climate.

South-westwards rises the regular dome-shaped Panecillo (Yavirac) eminence, crowned by ruins dating from the Inca period and by Spanish structures. This old volcanic cone commands a panoramic view of the whole city, with its suburbs, its monuments, and gardens, together with the vast circuit of volcanoes bounding the horizon on all sides—the sharp-peaked Cotocachi on the north, then to right and left massive Yana-Urcu, snowy Cayambe, Sincholagua, smoking Cotopaxi, with its humbler neighbours, Pasochoa and Rumiñahui, and lastly the western chain formed by Corazon, Atacazo, and double-crested Pichincha.

Regularly laid out, but built of low houses, here and there cracked by earthquakes, "Quito bonito" (the "charming"), as the surrounding peasantry call it, is nevertheless a dull city, like the people that inhabit it. There are, however, a few interesting buildings, a library, museums, some fifty convents, mostly dilapidated. Several of these contain some fine paintings, for Ecuador boasts of having created the "Quito School" with over a dozen painters constantly engaged in reproducing the images of the saints for the local demand and for the export trade. As there is no school of design, nearly all the artists begin as simple pupils with their father or some patron, and several acquire a remarkable dexterity in handling the brush.

The observatory, which recent studies place some 18 miles east of the position indicated by Humboldt,* stands in the middle of a garden at the north-east

* Longitude of the Quito Observatory according to Humboldt: 81° 4′ 38″ E. of Paris; according to Stübel: 80° 47′ 54″.

EAST VIEW OF QUITO AND MOUNT PICHINCHA, SEEN FROM LA LOMA DE POINGASL

extremity of the city. Here is seen the famous stone on which La Condamine and his associates commemorated, by an inscription, their operations connected with the measurement of an arc of the terrestrial meridian. But the base line which they had traced with so much care north-east of the city, and which enabled them to measure three degrees of the meridian between Ibarra and Cuenca, can no longer be identified. Either through some narrow patriotic feeling of jealousy or through barbarous ignorance, the Government ordered the two terminal pyramids to be razed which La Condamine had erected, one near the town of Pifo, between Cotopaxi and Cayambe, the other on the edge of the Guallabamba gorge. The first, that of Oyambaro, has been reconstructed since the War of Independence, but not on the old site and only as a commemorative monument; the second (Caraburo)

Fig. 97.—Quito and its Environs.

Scale 1 : 760,000.

may possibly occupy its original position, though Whymper was unable to determine the point. Some blocks in the neighbourhood of Quito recall the old fortresses of the Incas and of their Cara predecessors.

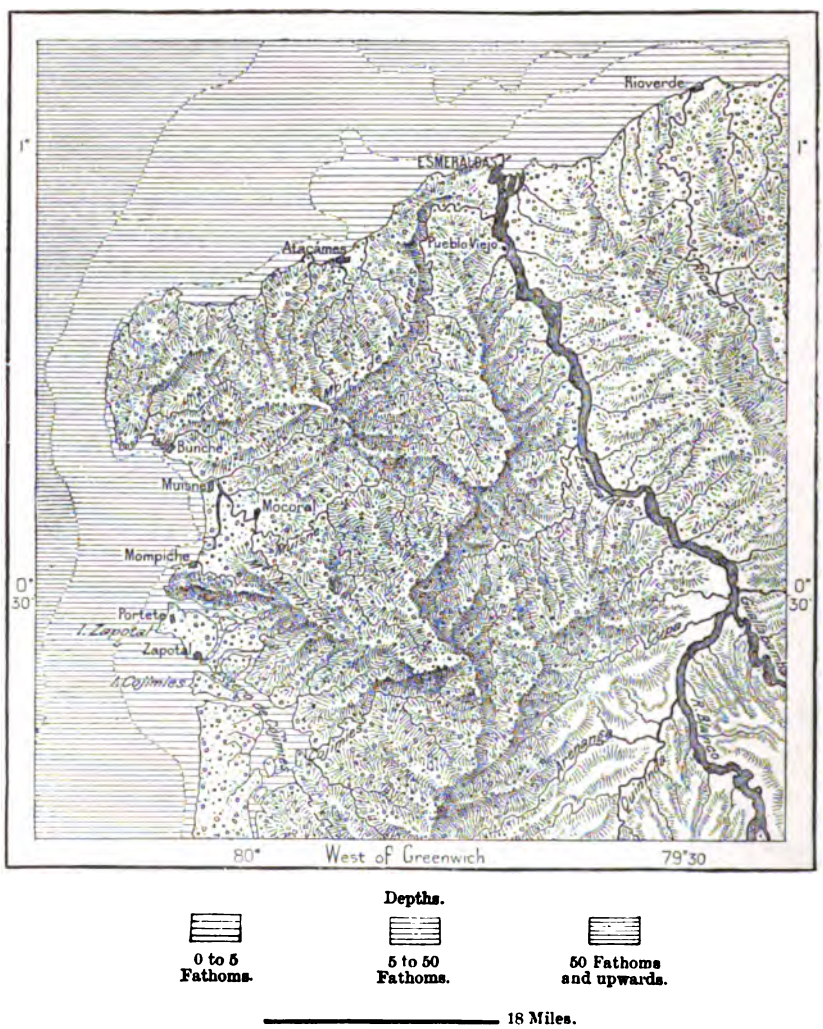
A carriage-road, often ploughed up by the rains, and always threatened by the avalanches of mud, connects Quito with *Ambato*. But Quito still lacks easy communication with the nearest seaport, at the mouth of the Rio Esmeraldas. The road begun by Maldonado in 1735 was never completed, though another has been begun farther south, to run through *Aloag*, along the base of Corazon and by the Rio Toachi valley. The port of *Esmeraldas* itself is obstructed by a bar, and Quito remains without any access to the sea except by the extremely difficult Guayaquil route, twice as long as that of Esmeraldas. The emeralds which excited the cupidity of Pizarro are no longer exported from this place; one of the stones

formerly worshipped by the people of Manta has, according to a local legend, been hidden by the natives. The mouth of the Rio Verde, a little north-west of the Esmeraldas estuary, indicates the spot where Pizarro landed in 1526 during his first expedition in search of Peru.

East of Quito the most frequented route crosses the Eastern Cordillera, between Sara-Urcu and Antisana, passing the village of *Papallacta*, *Baeza* in the

Fig. 98.—Esmeraldas.

Scale 1 : 950,000.



territory of the Quijos, and the town of *Archidona*, whence travellers descend to *Puerto Napo*, at the head of the navigation of the Rio Napo.

Latacunga (*La Tacunga*, *Tacunga*) is the highest town (9,200 feet) in the Pastaza valley. It stands to windward of Cotopaxi, by which it has been frequently destroyed, but has always revived, thanks to its favourable position on

the route from Quito to Guayaquil. Latacunga is the seat of one of the chief colleges of Ecuador, founded by one of its citizens, in honour of whom the province has received the name of Leon.

Ambato, lying some 18 miles farther south in the upper Patate basin, has also been frequently threatened by the neighbouring volcanoes. It is separated by the spurs of Chimborazo from *Riobamba*, which lies in the same basin to the west of Altar. The old city—founded by the Puruha Indians about 10 miles farther west, where are now the villages of *Cicalpa* and *Cajabamba*—having been destroyed by the earthquake of 1797, the present site was selected as being less exposed to disasters. In the vicinity is shown the chasm in which the town of *Cacha*, with its 5,000 inhabitants, was swallowed up in the year 1640. Of all the cities of Ecuador, Riobamba commands the most extensive panoramic view of the snowy heights grouped in amphitheatrical form about the plateau.

The carriage-road crossing the plateau stops at the foot of Chimborazo between Ambato and Riobamba. At this point travellers bound for Guayaquil leave the inter-Andean plains and turn the great mountain on its south side by the Arenal route, unless they prefer the alternative road over the Tiocajas Pass down to the towns of *Alausi* and *Sibambe*, thence reaching the Chimbo terminus of the railway in the Rio Chimbo valley.

Tiojacas, the natural stronghold of the upper Pastaza valley and of the more thickly-peopled regions of Ecuador, was at all times a strategic position of the first importance. Here the Incas conquered the native tribes; here, also, Belal-cazar gained the decisive battle which opened the road to Quito, and other sanguinary engagements have been fought at the same place during the civil wars of the present century.

As a section only of the trunk line of railway has been completed (1894), nearly all the traffic between the plateaux and Guayaquil continues to follow the old route, where travellers may usually procure mounts and pack-mules. *Guaranda*, on a terrace dominating the upper Chimbo valley from an altitude of 8,890 feet, is the intermediate depôt of this traffic. Farther down, the Rio Chimbo plunges beneath the *Socabon*, a natural bridge of imposing size. The ordinary route from Guaranda to Guayaquil does not follow the banks of the river, but rises westward to the Tambo Gobierno Pass, crossing the Chimbo range at a height of 10,420 feet, whence it descends to the Guayas valley at the Babahoyo confluence, where the river becomes navigable for steamers. During the floods, from January to May, the village of *Bodegas* (*Babahoyo*), standing at this point, is completely inundated up to the second storey of the houses, and the alligators disport themselves in the flooded streets.

A conic eminence 980 feet high, at the foot of which are grouped the houses of *Zamborondon*, indicates the point where the Guayas estuary begins. Here the current frequently shifts its beds with the tides and inundations.

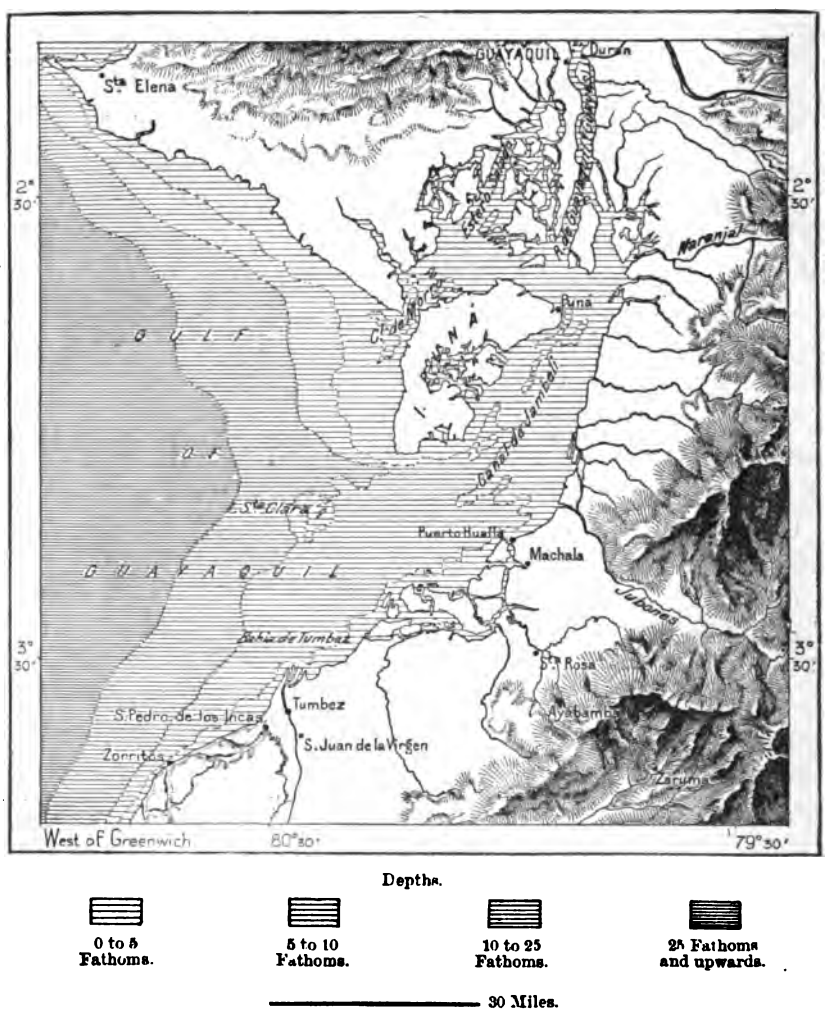
Guayaquil, converging point of nearly all the trade of Ecuador and of its capital, develops along the west bank of the Guayas a handsome façade about two miles long, above which are seen the towers of some fine structures. Its busy quays,

the vehicles driving about in all directions, the flags waving over its balconies make it the liveliest place on the coast for a distance of over 1,200 miles between Panama and Callao. Despite various disasters, piratical attacks, fires, frequent street fighting during the civil wars, Guayaquil has always rapidly recovered, thanks to its favourable position at the head of the deep inlet penetrating into the interior in the form of a cornucopia curving round to the north.

Guayaquil represents the old Indian city of *Culenta*, which, however, was dis-

Fig. 99.—Guayaquil Estuary.

Scale 1 : 1,800,000.



placed, and is now indicated only by the remains of *Ciudad Vieja* ("Old Town"), on the slopes of the northern hills. The Spanish settlement, founded by Belalcazar in 1535, stood farther south, and was connected with the native town by a causeway 2,300 feet long, carried over the intervening channels and morasses. The harbour, which chiefly exports cacao, the staple product of tropical Ecuador,

GUAYAQUIL.

is accessible at low water only to craft of moderate draught; larger vessels, drawing up to 21 feet, ride at anchor in the estuary lower down. The navigable channel passes south of the islet of Santa Maria (Amortajada), and then sweeps round to the east of the large island of Puna through the Jambeli passage, which leads north to the Rio Guayas. Here the Estero Salado ("Saline Estuary"), which winds to the west of the city, is available only for boats and barges.

Being thus encompassed by brackish creeks, Guayaquil was till recently destitute of fresh water, which had to be sent down from the upper reaches on rafts laden with pitchers. Now, however, potable water is brought from a valley of the Andes by a canal running parallel with the railway. River steamers convey goods for the interior either to the bodegas of Babahoyo, or to the suburb of *Duran*, facing the city on the left bank of the estuary. Here is the seaward terminus of the Ecuador railway, whose first station, *Yaguachi*, on the river of like name, was formerly the depôt for merchandise destined for the plateau. But the harbour having silted up with the alluvia of the river, the place had to be abandoned by the traders.

Guayaquil depends almost entirely on its import and export traffic. The chief local industries are tanning and shipbuilding, the neighbouring forests yielding an abundance of excellent timbers (*guachapeli*, *guaiac* and *guarango*), which are easily worked, and are practically incorruptible, resisting the attack of worms better than any other species.

On the west side of the Guayaquil peninsula stands the little seaport of *Santa Elena*, which like the village of *Puna*, on the island of the same name, is one of the health resorts of Guayaquil. It exports salt, dried fish, wax, cattle, straw hats, and small decked and open craft caulked with *copé*, an oily substance oozing in abundance from the neighbouring beach. Mixed with other ingredients this copé is also used in the treatment of cutaneous diseases in man and beast, and it even yields a gas light for Guayaquil. Eastwards rises the mud volcano of *San Vicente*, the only one occurring on the west coast of South America.

Between Santa Elena and Esmeraldas follow a few little seaports, such as *Manta*, which exports the produce of the inland towns of *Montecristi* and *Jipijapa*. But the chief place in the whole region comprised between the sea and the Western Cordillera is *Puerto Viejo* ("Old Port"), which, despite its name, lies some 18 miles in the interior. The Rio Charapoto, on which it stands, marks the limit between the forest zone and the arid plains stretching southwards. A broad inlet north of *Charapoto* terminates in the estuary or Bay of *Caraques* (Caracas), so named from the Caraques (Caraqui) Indians, former rulers of the land. Caraques stands on the south side of the estuary, but its harbour is unfortunately obstructed by a bar impassable by large vessels.

The Rio Grande (Cañar), which enters the Gulf of Guayaquil opposite the island of Puna, and whose port has taken the name of *Naranjal* from the neighbouring "orange"-groves, recalls the powerful Cañar (Cañares) nation, which offered such a stout resistance to the Incas. The present town of *Cañar* lies higher up the river near the pre-Columbian ruins of *Hatun-Cañar* and *Tomebamba*—the

former said to have been Huayna-Capac's palace a few years before the arrival of the Spaniards; the latter an old stronghold captured in 1530 by Atahuallpa after the massacre of 60,000 of its Cañar defenders.

South-west of Cañar and on the same Pacific slope stands the flourishing town of *Machala*, whose harbour, *Puerto Huaila* or *Bolivar*, lies on the Jambeli channel

Fig. 100.—Cuenca Basin.

Scale 1 : 930,000.

under the shelter of the islets of like name. Here are shipped the ores from the *Zaruma* valley in the upper Rio Tumbez basin, the only important mining district in Ecuador. Its decomposed porphyry rocks, transformed to a reddish clay, contain veins of gold formerly worked by the Indians, and now treated by an English company by a new process. Between 1888 and 1891 the Zaruma gold-mines yielded an average annual output of about £11,000. Copper ores occur in the

neighbouring cliffs. A few other southern towns—*Celica, Catacocha, Cariamanga*—are also situated on the Pacific slope; the headstreams of their valleys unite to form the Rio Achira (Chira), which reaches the coast at Paita Bay, between the Tumbez and Sechura deserts.

But the better-peopled districts of this part of Ecuador lie on the Amazonian slope. The chief towns and most fertile plains are situated in the upper basin of the Paute (Santiago), which joins the Marañon just above the Pongo de Manseriche. *Cuenca*, metropolis of this district, occupies, with its suburb of Egido

Fig. 101.—Loja Mountains.

Scale 1 : 1,000.000.

(8,830 feet), the fine plain of Bamba, where the running waters vanish in a rocky cavern and reappear five miles lower down.

The province of Azuay, whose capital is Cuenca, supplies a large part of the republic with wheat and cattle, while its industrious inhabitants, of Cañar origin, prepare woven fabrics and straw hats. Despite the successive invasions of Incas and Spaniards, their old culture has been but slightly modified.

South-west of Cuenca are situated the much-frequented thermal springs of *Baños*, but the mineral deposits of the district, formerly worked with profit, are now for the most part abandoned. The town of *Azoques* ("Mercury") no longer collects the quicksilver occurring in the neighbouring sandstones; the Indian village of *Macas*, in the forest zone roamed by the Jivaros, has also ceased

to yield the large quantities of gold which formerly earned for it the title of *Sevilla de Oro*.

Between Cuenca and *Jiron*, overlooking the old lacustrine plain of Tarqui, stands the "Pyramid Mountain," so named from the signal set up by La Condamine at the extremity of his chain of triangles taken for the measurement of the meridian. The carriage-road which is to connect Cuenca with the port of Naranjal over the Cajas Pass has been scarcely begun.

Although less healthy than Cuenca, the sanatorium of south Ecuador, the town of *Loja* is perhaps better situated for traffic, standing as it does at an altitude of 7,300 feet, the most favourable under the torrid zone, and at a point in the Cordillera which would present the least difficulty but for the horrible road. But despite its advantages Loja has diminished in population. Owing to the destruction of its cinchona-trees it has lost the export trade in bark, of which it had formerly a monopoly. The town of *Zamora*, on the river of the same name, which served as its eastern outlet towards the Amazons, has also ceased to exist, its Indian inhabitants having either perished or dispersed.

Logroño, on the Rio Paute, has similarly disappeared under an exuberant forest growth, and solitude reigns in a region which seemed destined to become the great trans-continental highway between Guayaquil and Para. With a railway constructed across the southern uplands of Ecuador from the Pacific coast to the head of the navigation on the Paute or the Zamora, the continent might be traversed in a week from ocean to ocean.

South of Loja is situated the upland valley of *Piscobamba*, where, according to the Indian legend, are buried the heaps of gold sent from Quito to Cajamarca to ransom the Inca Atahuallpa. Many fortune-hunters have been ruined in their vain quest for these treasures.

VII.

Material Condition of Ecuador.

Of all the Hispano-American republics Ecuador has been the least modified under the influence of European customs and ideas. On the elevated plateaux, always difficult of access, the Quichua, Cañar, and Puruha natives scarcely changed their social habits in the presence of a handful of whites, themselves almost cut off from all intercourse with their fellow-countrymen elsewhere. The first collision had been terrible and decisive, and after the battles, massacres and epidemics the surviving Indians had been fain to adapt themselves to a new political system, to work for new masters, to give up the road to the old places of pilgrimage, and to worship at new shrines.

But once this transformation was effected, the descendants of the Quitu and kindred nations, but slightly crossed with the ethnical element of European origin, maintained themselves without further change. Their conservative spirit was subjected to no fresh strain, and the whole population remained docile and sub-

missive to their secular and religious masters, without betraying the least disposition to revolt. The later political movements had their origin, not in the lower strata of society, but exclusively in Quito and the other cities, where the creoles of Spanish descent felt themselves outraged in a thousand ways by the privileges and arrogance of the fresh arrivals from the peninsula. Lawyers ousted from their lucrative positions by young Spanish favourites were the instigators of the first rising, which took place in 1809 at Quito, "in the name of the legitimate sovereign, Ferdinand VII., and of the holy Roman Catholic Church." But the mass of the nation took no part in this outbreak, which was soon crushed by a general massacre.

Agriculture—Trade—Industries.

Nevertheless, since the War of Independence and the constitution of an autonomous republic in Ecuador, the new order of things has necessarily been followed by certain changes in the social condition of the people. Some of the rural classes have been attracted to the large towns by the development of trade, and in a less measure by the awakened thirst for knowledge. Following at a long distance the example of the United States, Australia and other commercial and industrial lands, Ecuador presents the phenomenon of a gradual concentration of its inhabitants gravitating round the various centres of the population. Of the sixteen provinces those possessing the three largest cities—Pichincha with Quito, Guayas with Guayaquil, and Azuay with Cuenca—contain far more than one-third of all the inhabitants.

Racial crossings, more developed in the urban than in the rural districts, tend to blend the ethnical elements in which Indian blood predominates, and at the same time diffuse European political and social sentiments. The inter-Andean region, where have sprung up all the towns, properly so called, except Guayaquil, may be regarded as practically constituting the whole of Ecuador, viewed from the standpoint of wealth and culture. Thus the vast province of Esmeraldas, perhaps the richest in natural resources, but lying in the hot zone beyond the Andean plateau, has according to the official returns only a hundredth part of the population. The province of Oriente, also, which alone comprises one-half of the territory, would appear to have only about 80,000 inhabitants, about as many as Plymouth, or any other second-rate English city.

Immigration—Social Condition.

The movement of immigration, except to Guayaquil, remains insignificant, despite the efforts of various financial companies, amongst others, an English association, to which the Government has conceded 1,750,000 acres on the banks of the Pailon and in the eastern forests. A small German colony has been established in the Cordillera about the sources of the Rio Toachi; but even in the capital, foreigners of all classes—professionals, artisans and labourers—may, so

to say, be counted on the fingers' ends. Many of the inland towns have not a single foreign resident.

But the inhabitants of the conterminous Colombian and Peruvian states, who can scarcely be regarded as aliens, freely cross the frontiers and settle in the territory of Ecuador. In the provinces of Carchi and Esmeraldas especially, the white, half-caste, and black immigrants from Colombia, numbering about 40,000, already form a considerable section of the population; which, however, differs little from the native element.

Ecuador, a country of old Spanish and aristocratic traditions, is also a country of vast landed estates. One proprietor is lord of Cayambe, Sara-Urcu and all the intervening plains and valleys. Another owns Antisana, with the farmsteads and cattle-runs of the whole district, while towards the Amazons his domain is boundless: "The land is his as far as you can go eastwards."

The result is that the bulk of the population are serfs, almost slaves, still burdened with debt, an oppressed generation whose woeful condition is disguised under the name of *concertados*, by contraction *conciertos*, as if their wretched plight were the effect of "free contract." The plough has not yet made its appearance in all the provinces, while few are the *haciendas* where the wayfarer can get so much as a cup of milk to quench his thirst. In some of the remote southern valleys the natives are said still to thrash out the corn by dancing on the ears with heavy clogs; hence it is not surprising that wheat-flour has to be imported from California and Chili.

Stock-breeding constitutes the chief industry on the plateaux, where certain runs, such as the *hato* of Antisana, contain over 5,000 cows, besides sheep and horses. Even some of the Indians, robbed of their lands, at least own sheep, which they graze on the bleak paramos. Besides the natural pastures lucerne is also grown as fodder in favourable localities.

But midway up the mountains the most profitable plantations are those of the coffee shrub, replaced on the plains lower down by sugar and cacao, of which the latter yields the best returns in Ecuador. Guayaquil also exports a large quantity of tagua, or vegetable ivory; which, however, is not cultivated, but grows wild in the forests.

Of the numerous mining districts that of Zaruma alone is worked with energy. Other industries, represented at Guayaquil by large steam factories, are undeveloped farther inland. Even the home industries of weaving and straw-hat plaiting, in the hands of the women, are yielding to foreign competition, which gluts the market with cheaper but greatly inferior goods. Possessing no cotton-mills or other large manufactures, Ecuador is compelled to import from the United States and Europe nearly all manufactured wares, taking them in exchange for the natural products of the land. This foreign trade, almost entirely concentrated in Guayaquil, represents an annual value of from £2,000,000 to £3,000,000, or about forty shillings per head of the population, a proportion lower than that of most countries within the sphere of European civilisation. The traffic is carried on, in order of importance, chiefly with France,

Great Britain, the United States, and Spain, the foreign shipping being more than half British.

Communications—Education.

In 1893 Ecuador still possessed only one carriage-road and one railway, the former 100 miles long, between Quito and Riobamba, the latter 63 miles long, between Duran, opposite Guayaquil, and the foot of the Andes. At the bridge spanning the Rio Chimbo the line is distant only 15 miles in a straight line from Sibambe, the nearest upland town. But so difficult is the intervening ground that, according to the engineers' survey, the distance would be increased to over 50 miles, winding round gorges and precipices, with an average gradient of about 3 in 100 yards. Here the route will have to ascend from a level of 1,135 to 8,860 feet above the sea, and it has been doubted whether such an incline is practical in a tropical climate subject to tremendous downpours, which sweep away the strongest embankments, and score with deep furrows all loose soil. Even the section already completed is still little utilised for the transport of goods to the plateaux, owing to the lack of pack-animals except along the old familiar route by Babahoyo. Hence forwarders prefer the difficult and, at times, even dangerous route by the southern foot of Chimborazo (15,660 feet). The Guamani Pass, on the road from Quito to the Rio Napo, is almost equally elevated, and still more dangerous, because less frequented and more neglected.

Steamers coming from the Amazons have now and then ascended the Napo and the Pastaza; but no regular service has yet been established on these or any of the other navigable rivers of the eastern province. In 1893 there was a total mileage of 1,074 telegraph lines, connected at Guayaquil by cable with the rest of the world.

Although slow, the progress of Ecuador is none the less real and continuous in agriculture, trade and the industries. A pledge of even more rapid development in the near future is afforded by the spread of primary instruction. In 1892 nearly 70,000 children, mostly boys, were attending the schools, where both Spanish and Quichua are taught. There are also nine schools for higher, and thirty-five for secondary education, besides three so-called "universities," founded at Quito, Guayaquil, and Cuenca.

VIII.

Government.

Although the republic of Ecuador is theoretically founded on the "sovereignty" of the people, the suffrage is far from being universal. The privilege of voting is, in fact, restricted to Roman Catholics, twenty-one or, if married, eighteen years of age, able to read and write, and possessing an income of 200 sucrés (about £40). The electors may even be excluded from the voting-books for misconduct, of which the administration is judge.

The legislative power has been entrusted to a Congress of two houses—a Senate composed of two members for each province, elected for four years, and a Chamber of Deputies elected for two years on the basis of one deputy for every 30,000 inhabitants. One-half of the Senate retires every two years.

Both president and vice-president are elected by direct popular suffrage, for four years, but the latter is nominated two years after the president, so that he remains in office two years after him, and is thus a member of two successive administrations. During his term of office the president is aided by a ministry of four members charged with the conduct of home and foreign affairs, finance, war, religion and public instruction. A council of state, nominated for six years, and composed of a Church dignitary, a judge of the High Court, and three others, controls the acts of the president, and, in case of divergent views, may submit the points at issue to the verdict of Congress.

The president appoints the generals and colonels, but only on the advice of the state council and after the sanction of Congress. He also chooses the judges of the higher courts from a list of three candidates presented by the Supreme Court of Justice. This tribunal consists in its turn of judges named by Congress for ten years and re-eligible. Their power is thus less exposed to political vicissitudes than that of any other functionaries.

Position of the Church—Finance.

The constitution is surrounded by numerous guarantees intended to make it immutable, as if everything did not ultimately depend upon the force of public opinion. No act can be subjected to revision or repeal until it has been enforced for a period of four years. On the other hand all modifications, after being voted by two-thirds of the national assembly, have the force of law only after the sanction of a new assembly.

Two articles of the constitution are withdrawn from all possible revision, one determining the republican form of government, the other declaring Catholicism, the Fé ("Faith") in a pre-eminent sense, to be the state religion. In fact, Ecuador, one of the few nations of modern origin with an official cult, proclaims itself explicitly "Catholic, Apostolic, and Roman," to the exclusion of all other creeds. "The only government which has a really and thoroughly Catholic character is the republic of Ecuador." The secular arm is required to "respect the official religion, to make it respected, to protect its liberty and its right." On assuming office both president and vice-president have to take an oath, more of a religious than of a political nature, either before Congress or before the Supreme Court, thus worded: "I swear by our Lord God and on this Holy Gospel to loyally fulfil my charge, to protect the Roman Catholic and Apostolic religion, to uphold the integrity and independence of the State, to maintain and cause to be maintained the constitution and the laws. Doing so, may God be my help and defence; not doing so, may He and my country call me to account!"

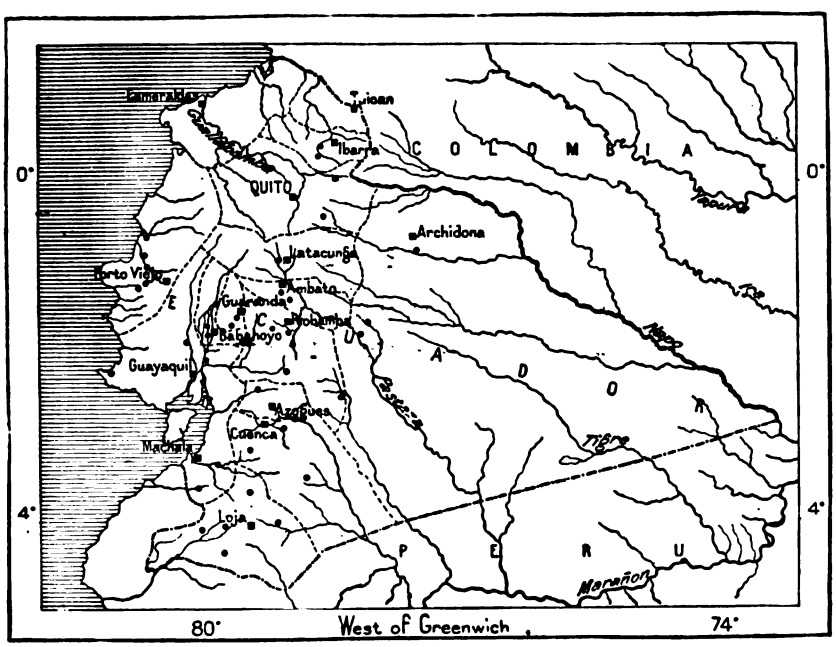
Formerly the rôle of Ecuador as a Catholic power was even far more explicitly

defined. Moreno, returned to Congress in August, 1873, thus clearly expressed the subordination of the State to the Church: "Having the happiness of being Catholics, let us be so frankly and without reserve, not only in the domestic circle, but also in our political life, and let us prove the sincerity of our convictions and of our profession of faith by the public testimony of our acts. Let us efface the last traces of all hostility towards the Church."

The introduction of books, periodicals, pamphlets was subjected to ecclesiastical control. Lastly, the whole republic was solemnly placed under the protection of the Sacred Heart of Jesus, while the army was divided into four bodies, those of the

Fig. 102.—Political Divisions of Ecuador.

Scale 1 ; 10.000,000.



Son of God, of the Good Shepherd, of the Five Wounds and of the Immaculate Virgin. The subdivisions also bore such devout titles as "Guards of the Virgin," "Zealots of Mary," and the like.

In Ecuador the ecclesiastical, more important than the civil, organisation comprises the Archbishop of Quito with the six suffragan bishops of Ibarra, Riobamba, Cuenca, Loja, Guayaquil, and Puerto Viejo. The dioceses are subdivided into vicariates, and these into parishes, nearly all of which coincide with the civil communes. The ecclesiastical budget averages from £160,000 to £200,000 a year, a prodigious sum for such a poor country. Moreover, the male and female religious orders, nearly all of which are represented in Ecuador, enjoy great power, and

nearly monopolise public instruction. Thus the Christian Brothers have charge of the primary schools, and all the "young ladies' academies" are directed by nuns, while the Jesuits administer the four high schools of Quito, Guayaquil, Riobamba and Cuenca.

The Indians of the eastern province have been placed under the care of the Jesuits, Franciscans and Friars of the Good Shepherd, each order having its own district, within which its jurisdiction remains undisputed. Nearly all the traders have been expelled from this territory, the missionaries undertaking all the barter traffic with the natives. Even many travellers are politely "boycotted," the Indians in obedience to orders declining to have any dealings with them. When strangers are admitted, the priest or magistrate appoints a certain number of Indians to carry their baggage, the stages being always arranged beforehand. Relays or porters are arranged for this service between the cold and hot zones.

About three-fourths of the revenue is raised from customs, the rest being derived from a tax of a thousandth on the sale of real estate and the transfer of capital, from the post office, sale of stamps, the brandy and salt monopolies, and the income of the national domain. A special tax has now replaced the tithes, which were formerly paid directly to the clergy.

The Government mints no money, silver specie and bullion being all imported from abroad. The municipal rates, averaging about £40,000, constitute a special budget in the several towns, and the chief expenditure, as in most other countries, is applied to the maintenance of the land and sea forces. The former comprise an effective of 3,000 infantry, cavalry and artillery; the latter includes five steamships of various sizes, a transport, a gunboat and a cruiser.

The administrative divisions, with their approximate areas and populations, are tabulated in the Appendix.

CHAPTER VI.

THE GALAPAGOS ARCHIPELAGO.

THE Galapagos ("Turtle") Islands, which form a little world apart far from the South American seaboard, belong politically to Ecuador, heir of the administrative province of Quito. Despite its distance from the coast, this group was probably known to the Quichuas. According to a Peruvian legend preserved by the Spanish chroniclers, a certain Tupac-Inca-Yupangui discovered in these waters the two islands of Hahua-Chumbi and Nina-Chumbi, meaning in Quichua "Seaward Island" and "Fire Island." Possibly some shower of volcanic ashes, or the flight of some strange birds, borne by a westerly gale to the shores of Peru, may have revealed to the Incas the existence of these western lands and induced them to send a fleet of rafts in their quest.

But the Peruvian legends were too vague to direct the Spaniards to the re-discovery of the group, to which their vessels were carried by a marine current. In 1535 Tomas de Berlanga, Bishop of Castille d'Or, on his voyage from Panama to Peru to report on the conduct of Pizarro, fell in with the archipelago, and even determined its exact latitude south of the equator. It was again visited in 1546, by the deserter, Rivadeneira, but was left unnamed by both of these discoverers.

At first the group was vaguely designated the *Islas Encantadas* ("Enchanted Islands"), doubtless because of their ill-defined position, constantly eluding the Spanish pilots. Lying far from the chief maritime routes, destitute of mineral treasures, and offering no attractions except their forests, their birds, fishes and turtles, these islands remained uninhabited till the arrival of the buccaneers, who used them as a rallying point for their attacks on the Spanish main, and also for repairing their ships and distributing their plunder.

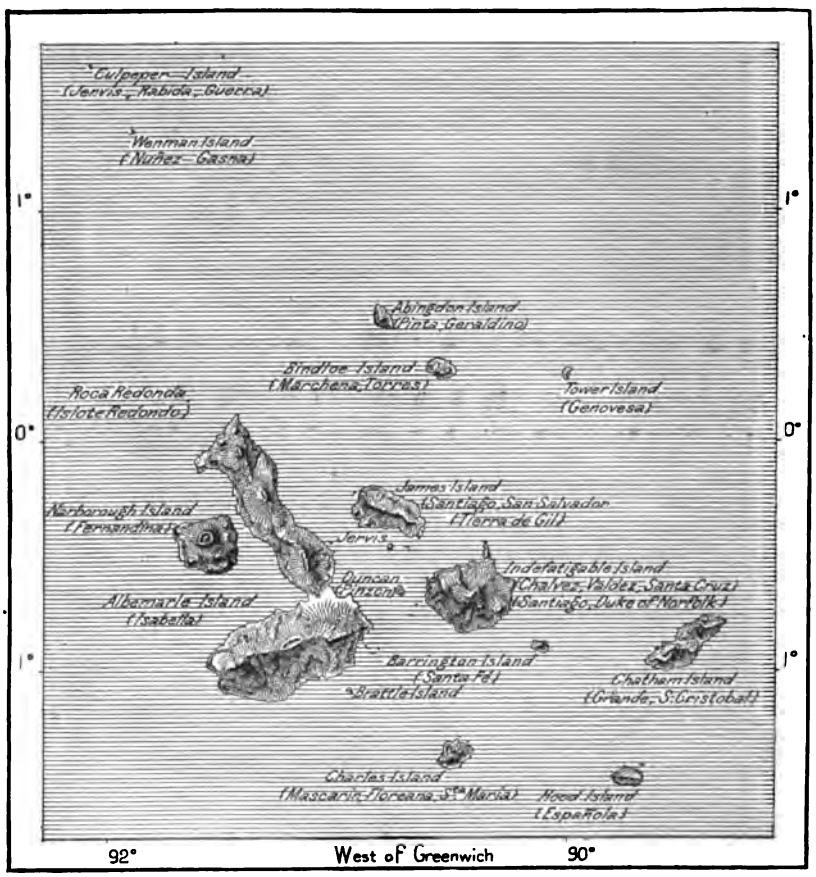
During the second half of the seventeenth century trading-vessels carefully avoided this nest of corsairs. Later the whalers utilised them as a victualling station for their fleets; but the first official survey was that of Alonso de Torres,

despatched for the purpose by the Viceroy of Peru in 1793. Even this summary exploration was followed by no attempt at colonisation, and during the War of Independence, Argentine pirates were able to establish themselves in the archipelago to mask their operations against the Spanish navy.

The republic of Ecuador delayed occupation of the islands till 1832, since which time they have been visited by few men of science; one of whom, however, was

Fig. 103.—Galapagos Archipelago.

Scale 1 : 3,600,000.



Charles Darwin, who explored the group in 1836. Thanks to his researches, the Galapagos have acquired a definite and important place in biological studies.

The fifteen islands and forty islets and reefs comprising the group have frequently changed name, nor is it possible to identify all of the designations adopted by Torres and the various navigators since the sixteenth century. To these, others have recently been added by the Ecuadorean Government; nevertheless, most even of the Spanish maps have retained the English names entered during the last half-century on the official charts of the British Admiralty.

Subjoined is a table of the various islands, arranged in order of size, and with their respective English and Spanish names.

Albemarle; Isabella.	Bindloe; Marchena; Torres.
Indefatigable; Infatiguable; Tierra de Valdez; Duke of Norfolk; Santa Cruz; Santiago.	Abingdon; Pinta; Geraldino.
Narborough; Fernandina.	Tower; Genovesa.
James; Santiago; San Salvador; Tierra de Gil.	Culpeper; Jervis; Rabida; Guerra.
Chatham; Grande; San Cristobal.	Wenman; Nuñez; Gasna.
Charles; Mascarin; Floreana; Santa Maria.	Barrington; Santa Fé.
Hood; Española.	Duncan; Pinzon.
	Islote Redondo; Roca Redonda.

The archipelago has a collective area of 3,000 square miles, with a settled population (1892) of 232, concentrated in Chatham Island.

From the easternmost reef of the archipelago to the coast of Ecuador the total distance is 574 miles, and the mean oceanic depth exceeds 1,250 fathoms, the greatest cavity revealed by the soundings of the *Albatross* being 1,675 fathoms deep. The islands are disposed in two groups, each resting on a pedestal of 1,000 fathoms. The isobathmic curve of 1,500 fathoms is developed along a submarine bank, which is prolonged north-eastwards under Cocos Island, tapering thence to a point turned towards the Azuero peninsula in the region of the isthmuses. Hence, if they are to be regarded as a geological dependency of the New World, the Galapagos Islands must be attached, not to South but to Central America, although still separated even from this region by depths of 1,500 fathoms.

Volcanic Formation.

But whatever be the origin of these oceanic lands, whether upheaved from the abysses of the ocean or the remains of some vanished continent, they have certainly been isolated from the rest of dry land since remote geological times. All are entirely composed of volcanic rocks, presenting little beyond molten lavas, obsidians, dolerites, basalts and other erupted matter of various ages. In the gorges of the volcanoes there, no doubt, occur here and there a few fragments of vitrified granite, but these were evidently torn from the marine bed and thrust upwards during the eruptions.

To judge from the disposition of the groups, the sea-bed would appear to have been rent by two systems of fractures crossing each other at right angles. The most numerous fissures run in the direction from south-east to north-west, parallel with the submarine plateau dominated by Cocos Island, and in a line with the igneous chains of Costa Rica and Nicaragua in Central America. This system is intersected by the second, which is disposed north-east and south-west parallel with the Eastern Cordillera of the Colombian Andes.

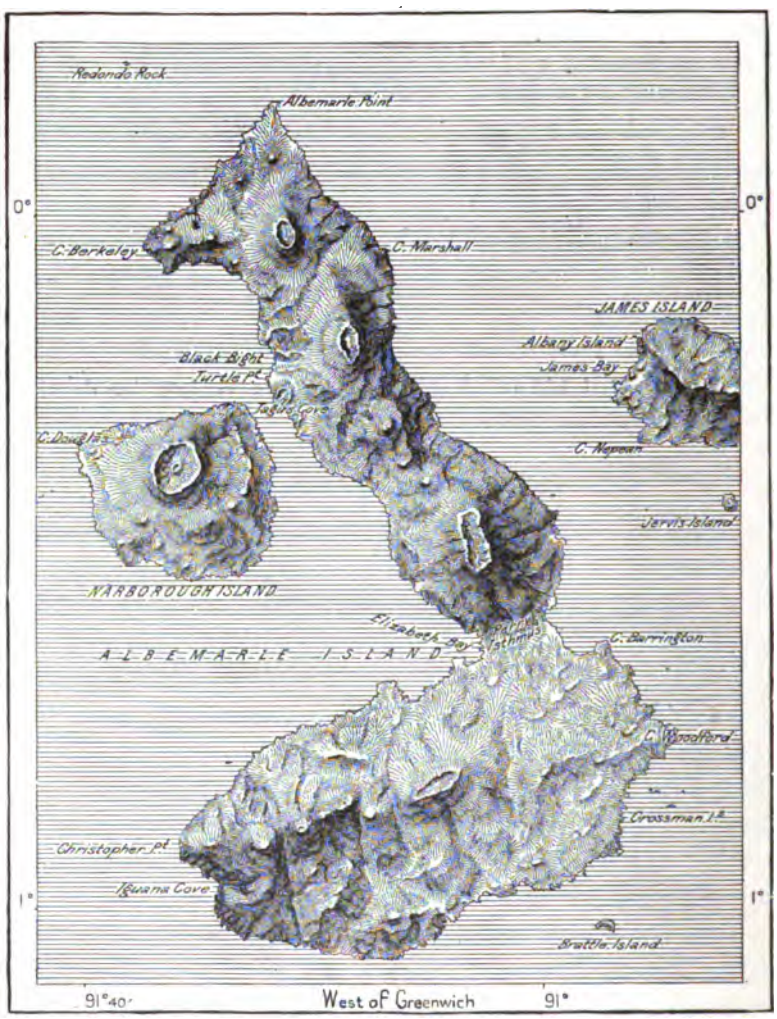
The large island of Albemarle consists of volcanic ridges belonging to both systems, the larger section rising parallel with Central America at right angles with the two smaller chains in the extreme north and south. A general upheaval of the archipelago would give a length of 300 miles to an elongated island trending south-east and north-west from Hood to Culpeper.

All volcanic life has ceased everywhere, except in the two western islands of

Albemarle and Narborough. In 1735 Admiral Byron saw flames shooting up from a cone in Albemarle, and in 1814 and 1825 other English observers witnessed eruptions in Narborough, where the volcanoes reach the greatest height, and where the red lavas best preserve the appearance of molten metal. All the summits, which vary in altitude from 1,600 to 3,300 and even 3,700 feet, had

Fig. 104.—Volcanic Group of Albemarle Island.

Scale 1 : 1,200,000.



18 Miles.

terminal craters, some obliterated, some still open and pierced with vents, from which were formerly ejected lavas or vapours. Besides these terminal vents, numerous openings occur on the lateral cones and even at the foot of the mountains. In the whole archipelago the still plainly visible craters are estimated at over two thousand.

Climate.

Although traversed by the equator, the Galapagos lie entirely within the climatic zone of the southern hemisphere, for the south-east wind prevails regularly, bearing its rains and its vapours to the upper slopes of the volcanoes. The archipelago is also exposed to the influence of the southern marine currents. After passing Cape Blanca, Humboldt's stream would seem to ramify into two branches, one of which continues its northerly course, while the other sets north-west and west in the direction of the Galapagos. In these latitudes both currents have a normal temperature of about 73° Fahr., or 5° less than in the intermediate space. In the archipelago this temperature is further diminished by another current coming directly from the south; west of Albemarle and Narborough, Wolf recorded only 70° Fahr., while Fitzroy found places in the neighbouring seas as low as 60° Fahr.

In the straits between the islands the currents move in some places north-westwards with a velocity of over two miles an hour. Thanks to the coolness of these currents, the archipelago enjoys a far more temperate climate than the section of the continental seaboard under the same latitude. The mean temperature scarcely exceeds 70° Fahr. at sea-level, although in some of the islands sheltered from the trade winds it may at times rise to 86°, and even 95° during the heat of the day. Speaking generally, the Galapagos may be said to have the same climate as they would have if removed some 1,200 miles from the equator.

The effects of this climate may be distinctly read on the mountain slopes. Geologists may doubtless recognise the different ages of the erupted rocks. But the chief contrasts are due, not to the nature or to the age of the igneous formations, but to altitude and the vertical disposition of the climates. Up to a height of 650 feet the bare rocks unexposed to any rainfall preserve their primitive aspect. They have their crests, their protuberances, their cavities caused by the explosion of gases, just as when they were first upheaved from the marine depths. But on the higher slopes and summits the rocky surfaces have been modified in accordance with the greater or less abundance of the rain waters brought by the trade winds. These rains have dissolved some of the chemical substances contained in the rocks, and disintegrated the rest, transforming the surface of the rugged lavas to a layer of red clay. The jagged heights and crests have been rounded off, and the whole covered with a dense vegetation.

On all the upper slopes, where the rocks are seen from a distance cropping out amid the surrounding verdure, the erupted matter is of too recent origin to be yet clothed with forest growths. At an average height of from 650 to about 800 feet the vegetation begins to girdle the mountain slopes, which are black or red at their base, and on their summits clad with a mantle of green. The cactuses and lichens, with here and there a few scrubby bushes, appearing in the fissures of the lower rocks, are replaced higher up by a narrow belt of thinly scattered trees, their branches draped with the "Spanish beard" and other parasitic growths. Then follow almost abruptly the dense leafy woodlands, the vegetation thus everywhere increasing in exuberance with the abundance of moisture.

The lower zone formed by the fringe of thickets is disposed obliquely to the sea-level, descending lower on the south-east slopes exposed to the moist trade winds.

The rain water which feeds the arborescent vegetation develops scarcely any springs and but few rivulets. Issuing slowly from the upper clays, the brooks nearly everywhere disappear in the porous lavas of the lower slopes. For the same reason these islands are destitute of guano, although the headlands are the resort of multitudes of birds. The salts, dissolved by infiltration, disappear in the ground.

Flora and Fauna.

Despite its distance from the continental seaboard, the insular flora presents an essentially American character. The species, however, are generally distinguished by their smaller foliage and less brilliant flowers; there is also an absence of lianas, while orchids and other epiphytes are rare, and in some islands nothing is seen but cactuses. The forests are not bound together in a compact mass of verdure by the coils of trailing plants, like the tropical woodlands of the New World. Palms, musaceæ, araceæ are all absent, and it would almost seem as if, by some strange phenomenon, the flora of the lofty equatorial Andes, as seen at an altitude of 10,000 feet on the flanks of Pichincha, had been bodily transported to the Galapagos volcanoes, only 1,000 feet above sea-level. On the highest summits round the edge of the craters are seen herbaceous growths like those of the paramos on the elevated Andean plateaux.

In the insular fauna, studied by Darwin, the great naturalist found numerous arguments in favour of the evolutionary doctrine which he afterwards formulated in his *Origin of Species*. Few oceanic archipelagoes constitute a more distinct biological world in the original form of its plants and animals. The species, however, are not numerous compared with those of tropical regions lying under the same latitude, although during the historic period increased by new types introduced from the Old and New Worlds.

The primitive mammalian fauna is represented by a single variety of the mouse, and even this was met by Darwin only in Chatham, easternmost member of the archipelago. He, however, determined the presence of twenty-six species of land birds, all peculiar to the Galapagos except a sparrow resembling the North American lark. One of the most remarkable forms is a bird of prey, already described in 1546 by Rivadeneira under the name of *hermoso girifalte*, "beautiful gerfalcon" (*craxirex galapagoensis*), which destroyed multitudes of young turtles.

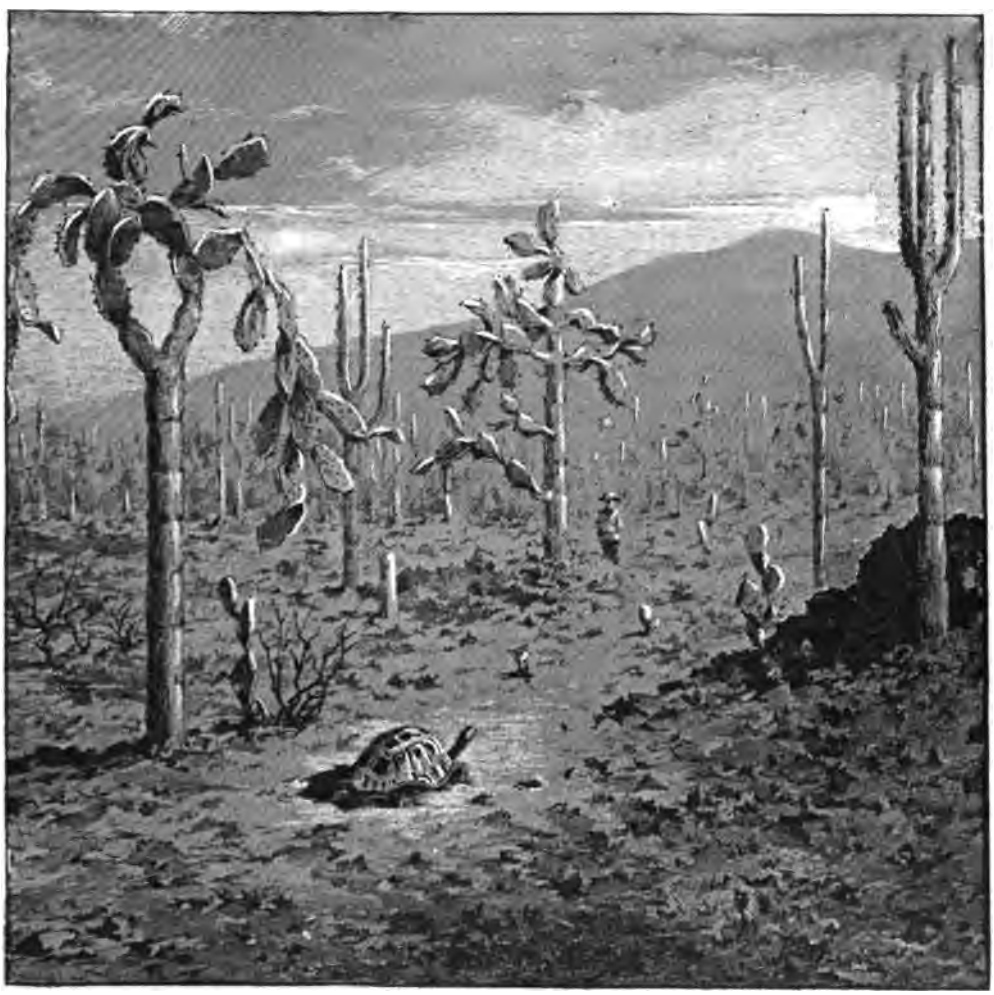
Since Darwin's voyage the naturalist Habel, who lived six months in the archipelago with the orchilla collectors, has doubled the number of known birds. The avifauna at present comprises fifty-eight peculiar species, including one discovered by Markham, and several islands, such as Albemarle, Hood, Tower, Wenman, and Culpeper, still remain to be explored. Amongst the different bird-forms several closely resemble each other, and according to a hypothesis of Darwin these descend from a single species, branching off in various directions during the course of ages. At the arrival of the first navigators these

birds had not yet learned to escape by flight and could often be taken by the hand.

The aquatic species, gulls, stormy petrels, and two or three others, belong exclusively to the Galapagos fauna, but are nearly all distinguished from their congeners of the opposite seaboard by their smaller size and duller plumage; in the latter respect they resemble the corresponding Patagonian forms.

Of all animal-forms the turtles were formerly most numerously represented,

Fig. 105.—Scenery in Indefatigable Island, Galapagos Archipelago.



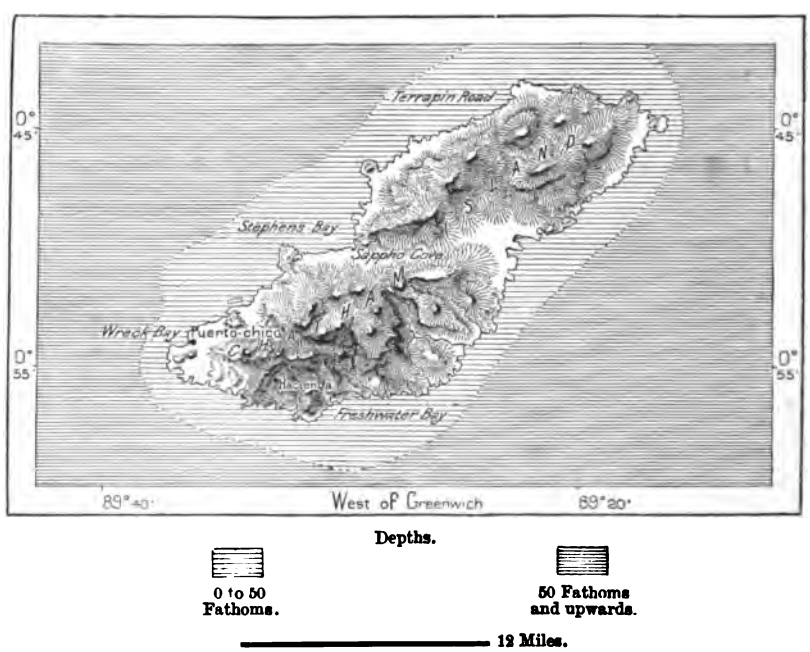
as indicated by the very name of the archipelago. When the first navigators landed they found turtles everywhere, in the arid coast districts as well as in the dank thickets of the hills and plateaux. All the beaten tracks crossing the brushwood had been traced nearly in a straight line by these animals moving to and fro between their feeding-grounds and drinking-places in the upper glens. Some weighed several hundredweights, and it took six or eight men to turn them

over; they swarmed in such multitudes that the crews of passing vessels occasionally captured hundreds in a single hunt.

But this source of wealth is now lost to the Galapagos; the land tortoises have become everywhere rare except in Albemarle, and have disappeared altogether from Chatham. The otters, or "sea lions," formerly abounding in the surrounding waters, have also vanished; but this region of the Pacific is still frequented by the whale, and sea turtles are also still very numerous in some places. In the waters of the archipelago is found a curious reptile, highly interesting to geologists, a marine lizard (*amblyrhyncus crustatus*), the last surviving species of a genus widely diffused in mesozoic times. In the interior of the islands various domestic animals—ox, ass, pig, sheep, goat, cat, and poultry—

Fig. 106.—Chatham Island.

Scale 1 : 600,000.



have reverted to the wild state, and an official report estimates at 25,000 the horned cattle at present roaming the archipelago. Some cultivated plants, also, such as the cotton shrub, tobacco, fig, orange, and chirimoya, now grow spontaneously in the woodlands.

It seems surprising that the Galapagos, with their elevated terraces, rich in pastures and easily cultivated, should have hitherto remained almost valueless from the economic standpoint. Although they might become as productive as the Hawaiian group, till recently they yielded nothing to the trade of the world except a few bales of orchilla weed, collected on the trees and shrubs of Albemarle.

A first attempt at colonisation was made by the Ecuador Government in 1832, soon after it had acquired possession of the group; but the undertaking ended in

failure. General Villamil, originally of Louisiana, formed a settlement of from 300 to 400 colonists in Charles Island, which he re-named Floreana. But the settlers soon found themselves without present resources or future prospects, and took the first opportunity to return to the mainland. No better success attended a second attempt made by Ecuador to utilise the same island as a penitentiary station and convict settlement. The enterprise had to be abandoned, owing partly to the expense of maintaining order amongst the convicts, partly to the difficulty of keeping up communications with the mainland. Hence Chatham Island, which has the advantage of lying nearest to Ecuador, and which is owned by a single proprietor, still remains the only member of the Galapagos Archipelago that has yet received any permanent colonists. Most of them reside at the little settlement of *Wreck Bay* (*Puerto Chico*), which, although swarming with sharks, is accessible to small vessels during the greater part of the year.

CHAPTER VII.

PERU.

I.

General Survey.

PIRU or Biru, famous land of the Incas, whose fame attracted from afar the Andagoyas and the Pizarros, and which from the very first year of its discovery filled the world with rumours of its fabulous wealth, has not maintained in history the pre-eminence which it had so early acquired in the popular imagination. Its mines are no doubt far from exhausted, and its agricultural resources rest undiminished; from the headwaters and upland valleys of the Amazons it commands scores of trade routes between the Pacific seaboard and the slopes facing the European seas.

Nevertheless, Peru has allowed herself to be outstripped by many other colonies whose very names long remained almost unknown. At the beginning of the century it was the foremost of the Spanish South American viceroyalties in trade and population; at present it occupies only the fourth place, coming next to Argentina, Colombia and Chili.

Gold, which had in such large measure caused the decadence of the mother country, was also the bane of Peru; it impoverished the soil, degraded labour and demoralised man. The Peruvian nation still feels to the very marrow of its bones the evil effects of the period during which its rulers thirsted after nothing but gold.

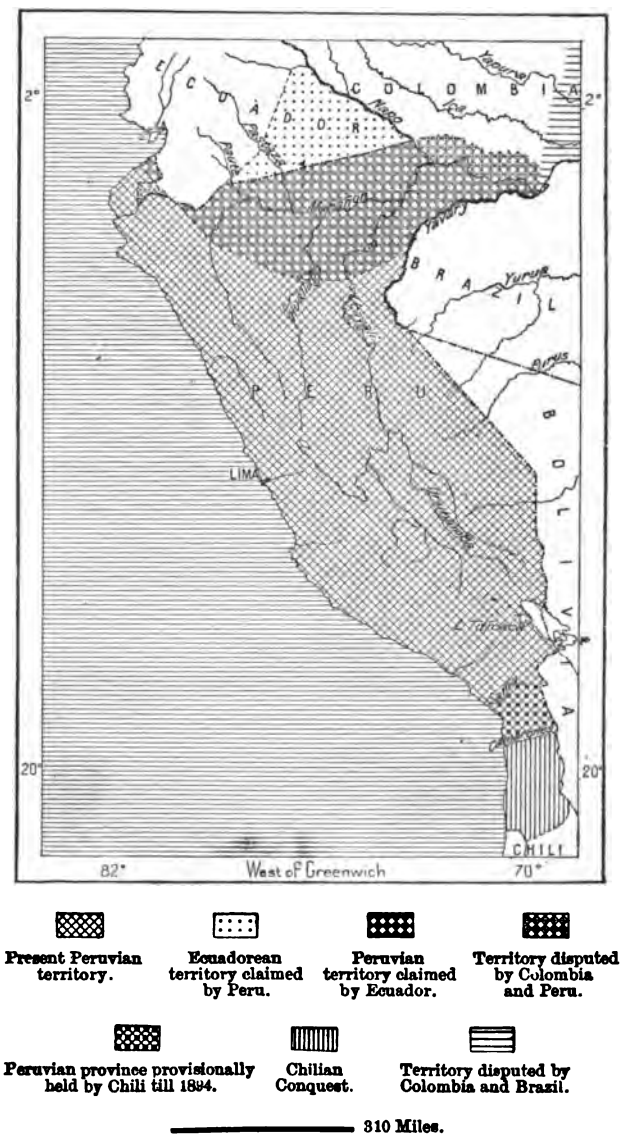
Disputed Frontiers—Extent.

Although deprived, in 1883, after her disastrous war with Chili, of a territory estimated at about 50,000 square miles, Peru still remains one of the large states of the New World. Even within its narrowest limits, as determined by the

claims of the conterminous republics, it has an area of at least 400,000 square miles, between three and four times that of the British Isles. But according to Paz Soldan it would comprise no less than 745,000 square miles, if the whole space were included which Peru demands on her own interpretation of the treaties.

Fig. 107.—Frontiers of Peru.

Scale 1 : 21,000,000.



In the north she claims the course of all the Amazonian affluents rising in Ecuador from the head of the navigation as indicated by the first cascades or rapids.

The frontier would thus extend to that of Colombia north of the Rio Napo,

and would run eastwards along 1° south latitude as far as the confluence of the Yapura and Apaparis, in the region of the llanos.

Farther on, the boundary towards Brazil would reach the junction of the Amazons with its Yavari tributary from the south. Here the frontier is officially determined by treaty, and by the commissions appointed to survey the ground in 1874, under Guillermo Black, and Hoonholtz, acting respectively for Peru and Brazil; the parting-line coincides with the course of the Yavari from its mouth to the point where it ceases to be navigable.

But farther on begin the disputed zones. Peru claims, south of 7° south latitude, a strip of territory extending for over 600 miles eastwards to the Madeira, and following the course of this river up to the Beni and its Madidi affluent, which form the boundary towards Bolivia as far as their source. On reaching the mountains the dividing-line again becomes more definite, following the crest of the Eastern Cordillera, and crossing Lake Titicaca in the direction of the Western Cordillera. Here Peru is conterminous with Chili, which, by right of conquest, has dictated the common boundary, which, according to the treaty of peace, coincides with the valley of the Sama between Moquegua and Tacna.

Except on the coastlands, the claims of the conterminous states are concerned only with little-known or even absolutely unexplored territories, inhabited by a few unreduced Indian tribes. Apart from such solitudes on the plains and on the Amazonian slopes, Peru, properly so called, may be said mainly to comprise only those Andean regions which correspond with the section of the seaboard extending from the Gulf of Guayaquil to the Arica bend, middle point of the west coast of the southern continent. To this should be added the two narrow strips formed by the banks of the Huallaga and those of the Amazons as far as Tabatinga. Thus defined, Peru constitutes a section of the Andean region presenting tolerably distinct natural limits—on one side, the Gulf of Guayaquil, with the lowest passes of the Andes between the Pacific and the axis of the Amazons valley; on the other, at a distance of some 1,200 miles, a second segmentation indicated by Lake Titicaca and the abrupt change of trend in the continental shore-line. The whole population, estimated at 3,000,000, is comprised within the limits of the vast quadrilateral.

Geographical Research.

During the first years of the Conquest the Spaniards had already traversed Peru in all directions. The two royal residences of Cajamarca and Cuzco being situated at the two extremities of the land, the conquerors were unable to consolidate their power without frequent expeditions across the intervening region. Then after Lima had been founded by Pizarro as capital of the Spanish possessions, a constant movement of troops took place between the coast and the large mining cities, and the strategical points of the interior. Even certain valleys beyond the Andes, which are no longer visited, such as the auriferous combes of

the Carabaya mountains, in the Inambari basin, are known only from the descriptions of the early chroniclers.

Thanks to the attractions of a country whose riches were increased a hundredfold by report, a great number of adventurers hastened to Lima, amongst whom were some explorers and even historians, who have left to posterity valuable descriptions of the land, of the customs, institutions, and social life of its inhabitants. Some of the writers took part in the events of that terrible epoch, while Garcilaso de la Vega, the chief historian of the generation that followed the Conquest, belonged at once to both races—Spanish on his father's side, Peruvian on his mother's, and grandson of an Inca.

After the conquerors came the missionaries, who crossed the plateaux to evangelise the tribes of the Amazonian slope, and gather them into the fold round about the parochial churches. These men made important geographical discoveries; Simon Jara, amongst others, penetrated into those magnificent plains known as the Pampa del Sacramento, which form the "Mesopotamia" between the Rios Huallaga and Ucayali.

But the work of the missionaries was not lasting; the groups that they had brought together died away; the roads traced through the woodlands were obliterated; solitude spread over those regions, which have to be again discovered, and which are now far less thickly peopled than at that time.

But many geographical points have been scientifically determined, and these are being connected by the continually contracting meshes of a network of itineraries. Since the War of Independence, Peru has been freely thrown open and traversed by numerous men of science, several of whom have left their mark in the records of systematic exploration. Such are Pentland, Meyen, Poeppig, Grandidier, Tschudi, Squier, Jimenez de la Espada, Markham, who have published remarkable descriptions of the interior; Fitzroy, Darwin, and recently Gormaz, who have surveyed the seaboard; D'Orbigny, De Castelnau, Marcoy, Herndon, Gibbon, Chandless, explorers of the trans-Andean watercourses; Tucker, Black, Werthemann, Guillaume, Marcel Monnier, surveyors more especially of the routes between the Pacific and Atlantic slopes; Rivero, Angrand, Wiener, Reiss and Stübel, whose studies have been mainly directed to the old populations, their monuments and industries.

For geography, in the stricter sense, the brothers Paz Soldan rank amongst the foremost writers and most useful cartographers, while Antonio Raimondi may be said to have been for Peru what his fellow-countryman, Codazzi, has been for Venezuela and Colombia. His great work on *Peru*, with the accompanying atlas of thirty-four sheets, is being continued under the direction of the Lima Geographical Society. Various "Andean Clubs" are also co-operating in the work of Peruvian exploration, while special commissions have been appointed to study the hydrography, the agricultural and commercial resources of all the valleys of the Amazonian slope.

II.

Physical Features—Orographic Nomenclature.

In ordinary language, the terms "Andes" and "Cordillera" are used indifferently for the whole mountain system which forms the backbone of South America; all the ranges are even collectively comprised under the general designation of "Cordillera of the Andes." But in the special geography of Peru the word "Andes" is applied to a particular range quite distinct from the other cordilleras. It is employed, in fact, in its original Quichua sense, to designate the mountains of the Quichua country, that is to say, of Ecuador, Peru and Bolivia, by which the border plateau of South America is bounded on the east side.

But whatever be the origin of the word itself, whether derived from the Antis people of the eastern slopes, or a shortened form of *Antasuya*, "Metal" or "Copper" Mountain, the Andes, properly so called, constitute the eastern escarpment of the great plateau between the Pasto group in south Colombia and that of Cochabamba in south Bolivia. To the western or coast range is more especially applied the term "Cordillera"; that is, the long "cord" skirting the continent from north to south, as viewed by the Spaniards arriving from the sea. All the other ridges of the orographic system are also so many "cordilleras," to which are given special names according to the regions which they dominate, or the cities rising in the valleys or on their flanks.

The Peruvian Andes begin with the single range of Loja in south Ecuador, which soon after entering Peruvian territory breaks into numerous ridges running parallel with the coast, and disposed somewhat uniformly, so as to form between the Pacific and the Amazons a series of natural regions, all trending north-west and south-east. The *Cuesta*, or coast zone, which rises gradually towards the foot of the Cordillera, also presents a number of distinct ridges, for the most part disposed in the same direction as the main range, though not usually regarded as belonging to the Sierra, that is, to the orographic system taken as a whole.

This word *Sierra* is not applied to any particular cordillera, although it may embrace several. Thus it indicates the region between the altitudes of 5,000 and 11,500 feet, which corresponds to the temperate lands of Mexico and Colombia, and in which the white race thrives best in a cultivated environment like that of Europe. Above the Sierra, the cold, but still cultivable regions between 11,500 and 13,800 or even 14,800 feet, take the name of *Puna*, a term synonymous with the Colombian paramo. It forms a narrow zone of terraces and passes exposed to gales and snowstorms, where the shepherd tending his flocks and the traveller crossing the mountains have to struggle hard to preserve the vital heat.

Still higher up the rugged cliffs, the snow-clad slopes and isolated crags, which till recently no Alpine climber ventured to scale, are comprised under the general

appellation of *cordillera*, which, as so used, is to be carefully distinguished from the Western Cordillera, or coast range.

Beyond all these parallel ranges the little-known eastern slope of the highlands disappears under the vast forests which merge in the Amazonian woodlands. The whole of this eastern section of Peru constitutes the so-called *Montaña*, whether it be "mountainous" or not, a region of great fertility, abounding in the most diverse natural products.

The Northern Cordilleras.

In the northern parts of Peru the mountains are of relatively low elevation, and of somewhat irregular form. In these regions the axis of the Andean system might seem to be indicated, less by any particular chain of heights, than by the deep valley of the upper Marañon, regarded as the main headstream of the Amazons. This axis is continued northwards by the Rio Chinchipe, which descends from the Loja uplands and flows in the opposite direction to the Marañon. Below their confluence the united waters, trending round to the east, pierce the easternmost chain of the Andes. Another crest, forming a southern extension of the Loja mountains, skirts the west side of the upper Marañon valley, beyond which it merges, south of the Cajamarca basin, in another cordillera rising immediately above the coastlands. Several summits in these various ranges exceed 10,000 feet.

But as they advance southwards the two mountain barriers rising between the upper Marañon and the Pacific attain in some of their precipitous spurs heights of 20,000 feet and upwards. The loftiest summits occur in the Ancachs section, although their names are still but little known. Such are the Cerro Huandoy above Caraz, the double-peaked Cerro de Huascan, and the Cerro de Hualcan. As measured by Hindle, the loftiest peak of Huascan (22,080 feet) overtops Chimborazo by about 1,350 feet.

On these uplands the lower limit of persistent snows descends lower than on any of the other Peruvian cordilleras. On the Yangunaco Pass, above Yungay, the snowy zone begins at 15,750 feet, whereas on the other Peruvian mountains, even those farthest removed from the equator, it scarcely reaches down to 16,500 feet. Usually the snowfields of the eastern slopes, exposed to the moist trade winds, are more extensive than on the relatively drier west side. Here the tepid sea breezes are intercepted by the lofty parallel ridge of the Cordillera Negra, which extends like a screen along the seaboard, and thus prevents the snows of the great Cordillera from melting.

The Cordillera Negra ("Black Range") has no passes lower than 13,800 feet, while some of its peaks exceed 16,500 feet, that is, rise above the snow-line of the greater Sierra. Nevertheless, the range still remains "black," being deprived of snow by the influence of the hot winds ascending from the coast to their summits. But the ravines in both ranges show traces of extensive glaciers, the remains of whose moraines are still visible.

The deep valley separating the Cordillera Negra from the Cordillera Nevada is commonly known as the Callejon ("Road," "Path") of Huaylas. It consists, in fact, of a long gulley between two chains which seem quite distinct, but which were formerly united in a single rampart. At the source of the Rio de Santa,

Fig. 108.—Drainage Area of Huaylas.

Scale 1 : 1,500,000.

where they have their common origin, it is easy to observe the cohesion at one time presented by both geological formations, which became gradually separated by the action of the snows, ice and running waters. The whole valley has been excavated step by step, forming at first a series of lakes connected by a river

flowing from one to another. Then the sills between each basin were slowly eroded by the stream till all the intervening rising grounds were levelled. Nevertheless, the observer may still recognise the several terraces of the old lakes, now transformed to verdant basins.

The Central Cordilleras.

South of the source of the Marañon all the converging chains, connected by lofty intermediate ridges, form the knot or group of the Cerro de Pasco, so named from the neighbouring city. Nevertheless, the two main ranges, Andes and Cordillera, may still be clearly distinguished in this section of the orographic system. Huaylillas, one of the summits of the group, towers to a height of 16,240 feet. Farther on, the range of the Andes proper, consisting of mesozoic rocks with crystalline nodes cropping out, trends away with perfectly clear outline in the direction of the south-east, with peaks over 13,000 feet high, but carved into separate blocks by the Perene and Mantaro affluents of the Ucayali. North-west of Cuzco it is even completely obliterated by the erosive action of the numerous main headwaters of the Apurimac, radiating like the ribs of a fan through a vast basin at a mean altitude of 7,600 feet.

A chain rising east of the Apurimac is followed by a second east of the Paucartambo, both evidently belonging to the same system, and developing their main axis in the same direction from north-west to south-east. One of the summits of the Sierra de Vilcaconga, east of the Apurimac valley, rises to a height of 13,650 feet, but it is greatly exceeded by the Carabaya range dominating the vast region of the Montaña, source of the great Amazonian rivers. Several of the snowy peaks of this range certainly rise above 15,500 feet. Chololo, which, however, lies in Bolivian territory a little beyond the Peruvian frontier, would appear to be 17,625 feet high.

This mountain indicates a break in the general trend of the system, which is here deflected a little to the south, as if in anticipation of the movement which farther on gives to the whole of the Andes, together with the continental seaboard itself, a normal direction from north to south in a line with the meridian.

East of the Rios Huallaga and Ucayali the ranges of heights, mountains or hills not yet measured are all developed parallel with the two main ranges of the Cordilleras and Andes.

South of the Pasco knot the Cordillera, properly so called, becomes merged in the escarpments of the inter-Andean uplands, rising but little above the level of the inland plateau. It takes the name of *Ceja* ("Eyebrow") of the Sierra, and presents the aspect of a mountain chain only on its west side, facing the Pacific. Nevertheless, it has some very lofty peaks, such as Viuda, north-east of Lima, and Meiggs, named from the engineer who pierced the crest of the Cordillera by a railway tunnel, both about 15,270 feet high. Meiggs terminates in the Pietra Parada, an isolated block on which the Archbishop of Lima was wont, during his visitations, to celebrate Mass in the midst of the snows.

East of Ica the Cordillera ramifies into two branches. The scarp of the plateau continues its south-easterly trend parallel with the coast, while the inter-Andean space is traversed by a connecting ridge, which usually takes the name of the Vilcanota knot. This series of meandering heights, however, is not a true cordillera; it deviates from the normal direction of the system, and is, in fact, merely a divide, left uneroded between two drainage areas—on one side the Amazonian slope with the thousand sources of the Apurimac and Urubamba; on the other the Pacific slope, divided into several secondary basins by numerous long but waterless gorges furrowing the whole face of the outer cordillera with deep fissures.

The chief summits of the water-parting rise along the southern prolongation of the Andean ranges here eroded by the running waters. Thus, Vilcanota (17,390 feet), which gives its name to the whole divide, stands exactly in a line with the axis of the main Andean range. Azungato, also south-east of Cuzco, from which its snowy peak is visible glittering in the sun, lies in the normal direction of another Andean crest.

The Southern Cordilleras.

In its southern section the Western Cordillera is distinguished from the other Peruvian chains by the presence of igneous cones, which make their appearance at a distance of about 1,240 miles from those of Ecuador. Their appearance may perhaps be a recent phenomenon analogous to the formation of the fluvial valleys which rise farther east, and which continue to traverse the range, despite the barriers of molten matter by which they must have often been obstructed.

The Misti and Omate Volcanoes.

The first group of these volcanoes, all exceeding 13,000 feet—Sara-Sara, Achatayhua, Coro Puna (comparable to Chimborazo in the extent of its snow-fields and the beauty of its crest), Ampato, Chachani (19,820 feet)—are all quiescent and snow-clad for a great part of the year, or even permanently. The famous Misti (Sucahuaya), whose superb snow-streaked cone rises immediately to the north-east of the Arequipa plain, owes its celebrity more to its imposing aspect and conspicuous position on the great Bolivian trade route rather than to its geological importance and altitude, though this is considerable enough (18,500 feet).

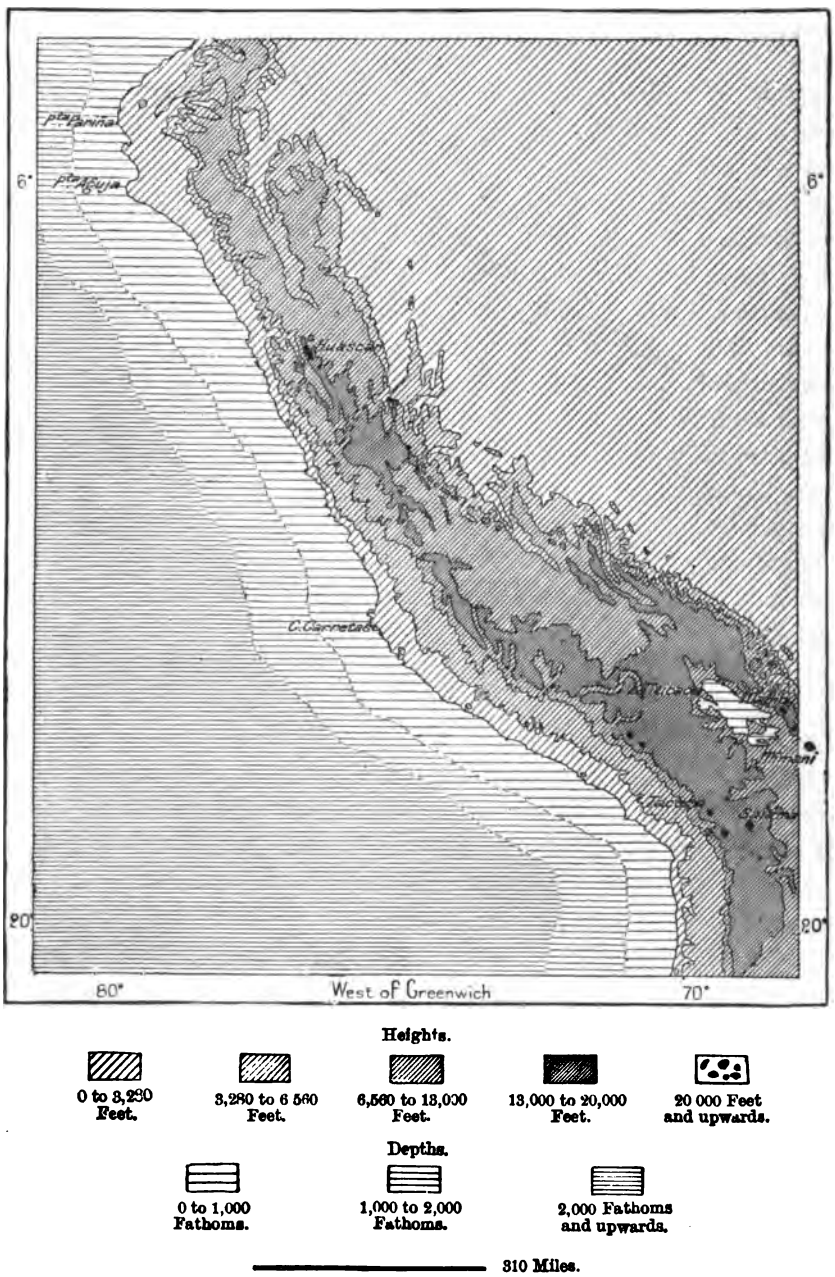
From time immemorial Misti has been in repose, and at present its crater contains nothing but ashes and snow. Yet from this focus appear to be propagated the earthquakes from which Arequipa has so often suffered, and by which it was almost entirely destroyed in 1868. Misti was first ascended by Weddell in 1847, and since that time the exploit has been often repeated, but always on the north side, facing Chachani. Ryder and Rothwell perished in the attempt to scale it on the west side in order to explore its crevasses. Henceforth, Misti cannot

AREQUIPA AND MOUNT MISTI.

fail to attract many visitors, thanks to the astronomic observatory founded by Pickering on Carmen Alto, one of its buttresses.

South of Misti extends the breached crest of Pichu-Pichu, followed by the

Fig. 109.—Zones of Altitude, Peru.
Scale 1 : 16,000,000.



elongated Omate volcano, called also Huayna-Putina ("Putina the Bold"). This is not so much an isolated mass as a crest some 18 miles long, whose highest

summit terminates in a sort of crown marking the orifice of the volcano. Although of less imposing aspect than Misti, Omate was at one time the most restless of all the Peruvian cones. In 1600 the column of vapours escaping from Ubinas, 15 miles to the north, is said to have suddenly ceased, while Omate, which had never before emitted smoke, became violently agitated, spreading darkness over a wide space and covering all the surrounding district with ashes. Six villages scattered over the lower slopes disappeared under a shower of scoriæ "a spear in thickness." Arequipa, over 42 miles away, was first half-ruined by the earthquake shocks, and then remained ten days shrouded in black night, during which the multitude prepared for the end of all things, while others tried to lose consciousness in drink.

The roar of the eruption was stated to have been heard at a distance of over 600 miles. At Lima, 530 miles off, the people thought a naval battle was raging in the neighbouring waters between the Spanish fleet and some Dutch corsairs. Wafted on the land-breeze, the volcanic dust was borne seawards 930 miles from the coast. In the surrounding district all landmarks between private property were effaced under the rain of ashes, and for six years after the disaster the Arequipa vineyards yielded no returns.

Farther south, but still within the Peruvian frontier, rises another burning mountain, Tutupaca, or Candarave (18,960 feet), at the south-west foot of which nestles a lagoon fed by the melting snows. The engineer Church, who scaled it in 1862, found on the summit a regular crater, where a little sulphur was deposited by the still ejected vapours. Tutupaca was the scene of a tremendous explosion in 1779.

The Pacific Coastlands.

Beyond the Cordilleras, properly so called, the zone of coastlands presents a few eminences whose glittering rocks are seen a great distance seawards by passing vessels. Thus the projecting headlands of North Peru between Tumbez and Lambayeque represent the terminal spurs of the coast mountains. Amotape, highest of these groups, attains an elevation of over 3,000 feet. It also bears the name of Cerros (Montes) de la Brea ("Pitch Hills"), and for over a century the people of the hacienda de Pariñas at the west end of the ridge used this *brea* or *copé*, natural tar or bitumen, for coating the inside of their earthenware utensils. But the substance was utilised for no other purpose until the reports of the fortunes made in the oil districts of the United States induced the local proprietors to turn to better account the treasures contained in the Amotape rocks.

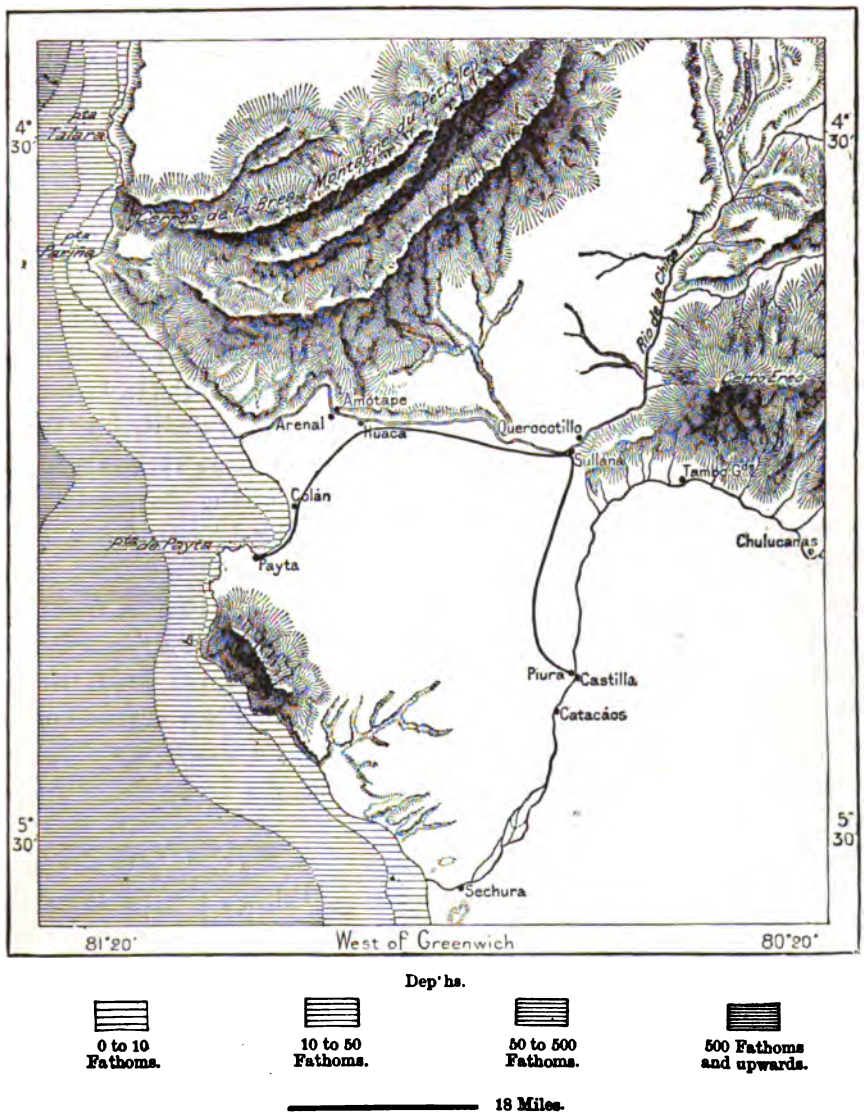
The chief reservoirs, occupying a space of about 2,500,000 acres, are distributed in the hills and along the coast from Tumbez to Sechura, and are far more extensive than the famous oil region of the upper Alleghany basin in West Pennsylvania. The asphalt occurs at an average depth of from 100 to 400 feet below various strata of sands, sandstones of marine origin, decomposed limestones and schists more or less charged with oil. In many places the oleaginous matter

is brought to the surface by filtration through the upper strata, and sometimes even gases and fatty substances ooze up.

South of Sechura some hills of similar formation are perhaps even richer still in underground reservoirs of petroleum, while the surface on the coast plains

Fig. 110.—Amotape Mountains.

Scale 1 : 1,200,000.



bubbles up, so to say, in miniature volcanoes, 30 feet high and 650 in circumference, from which the bitumen escapes in a liquid state, often mixed with salt water, and rapidly solidifies on the ground. The Garita and Reventazon plains near the sea are dotted over with hundreds of these hillocks of hardened pitch.

Submarine streams of petroleum are even carried seawards, and iridescent films of oil are often seen glistening on the surface of the water.

Along the seaboard follow other hilly groups separated either by fertile alluvial valleys, or by ravines which cannot be cultivated for lack of fertilising water. The Sierra de Paita, between the Rios Achira and Piura, has an elevation of scarcely 1,300 feet; but farther south the coast range skirting the Sechura desert attains a greater height in Mount Ilescas. The headland projecting from this point north-westwards to Punta Aguja ("Needle Point") is the most advanced promontory of South America.

North of Lima the coast range culminates in a conic height to which has been given the name of Darwin (5,840 feet). Other less elevated groups dominate the valley of the Rio Rimac and the Peruvian capital. South of the Rio Grande, Mount Criterion rises to an altitude of about 5,800 feet, while near Islay the coast range, limited by the Rio Vitor, has an extreme elevation of 3,350 feet.

The whole of this seaboard is subject to frequent underground disturbances, and Callao, after being destroyed in 1630, was again nearly ruined in 1746, when a huge wave hurled the shipping in the roadstead over piers and quays, and on retreating left hundreds of houses levelled with the ground. These convulsions are associated by the geologist Süss with a deep movement of the rocks caused by the subsidence of the cliffs along the coast in the abysses of the Pacific Ocean.

But in any case the Peruvian seaboard presents some curious phenomena which were formerly attributed either to an upheaval of the shore or to a retreat of the marine waters. On the northern slopes of the island of San Lorenzo, sheltering the roadstead of Callao, are seen a series of three terraces which, although somewhat obliterated, Darwin recognised as old beaches covered with shells of the contemporaneous epoch in various stages of preservation according to the different heights of the upheaved terraces. The upper beach stands at present 84 feet above the mean level of the ocean. These changes of level, however, may have taken place in remote prehistoric times, while the shells observed by the great naturalist may perhaps be the accumulated refuse of kitchen-middens.

The apparent marine erosions seen higher up on the cliffs have also by some naturalists been referred to the action of certain lichens, causing the rocks to gradually crumble away, and in the course of a few years excavating veritable caverns. Mr. Nation, of Lima, informed Mr. John Ball that after twenty-five years' study he was satisfied that the appearances are due to sub-aerial and not to marine action. "The chief agent, in his opinion, is a cryptogamic plant growing on the surface of the rock. During a great part of the year, when dense fogs prevail at this elevation, the plant is in active vegetation. In the alternations of relative dryness and dampness of the air the cells swell and mechanically remove scales from the surface, which are seen to accumulate rapidly in the course of a single season. I am disposed to think that vicissitudes of temperature play a great part in the disintegration of rock surfaces, and such action must be increased by alternations of moisture and dryness which must occur where, during

a great part of the year, the hills are covered with fog in the morning and exposed to the sun in the afternoon."*

Nevertheless a real upheaval of the land would appear to have taken place after the earthquake of 1746; at least, the strait flowing between San Lorenzo island and the mainland had become so narrow that the boys of the district were able to throw stones right across from shore to shore. But the recorded changes of level may possibly be due to volcanic shocks thrusting up or engulfing the coastlands. San Lorenzo is still about two miles from the mainland, as before the disturbance of 1746, and an old garden in which were cultivated *camotes* (sweet potatoes) still bears its name of *Camotal*, but is now a marine sandbank. North of the bay some sugarcane-fields have shared the same fate, while near Lurin, south of Callao, the holy island of Pachacamac, two miles from the coast, was still a peninsula at the time of the Conquest. The original site of Callao itself lies now at the bottom of the sea, and the old sailors used to relate that when passing at midnight over the submerged city they could see from their boats the people seated at the doors of the houses, and even hear the shrill crow of the cock beneath the waters.

Darwin and Tschudi also speak of upheavals in the interior of the country shown by the change of level in the old valleys, where the streams no longer flow in the same direction as formerly. Thus the bed of the Rio Chillon, north-east and north of the plains of Lima, is interrupted at one point by a hill which has obliged it to open a new passage by a great bend round to the west. Another old watercourse met farther north, on the road between Casma and Huaraz, has also changed its direction, leaving in one place a dry bed which was formerly tapped by irrigation rills.

The various rocks, argillaceous or sandy heights, also appear to have been subject to the action of marine or fluvial waters, as shown by the erosions, the siltings, and the shell-heaps strewn round about their base. In the desert regions marine sandhills occupy vast spaces along the seaboard, where all are disposed in *medanos*, or crescents, following with regularity, and by the character of both slopes and of the crests everywhere indicating the direction of the prevailing wind. Near Casma, in north Peru, musical notes like those of an organ are often heard during the great heats of the day, emitted by a mountain covered with sands. Unable otherwise to explain the phenomenon, the natives suppose that the eminence is a "water volcano," and that the sound results from the liquid mass boiling inside. But this music, like that of Serbal in the Sinai group, and of so many mountains elsewhere, must be due to the incessant movement of the sand particles vibrating in the heat. The stronger the breeze the louder the notes.

Although in general somewhat regular in its trend, this part of the coast presents a few small prominences, which resemble each other in their outline, and which are due to the underground forces all acting in the same direction. Thus the shore stretching south of the Amotape hills is diversified by a series of hooks

* *Notes of a Naturalist in South America*, p. 114.

facing northwards and intercepting the sands, which are carried along by the current setting southwards. South of the Rio Santa the coast is similarly indented by remarkably regular oval inlets, separated by islets and promontories from the

Fig. 111.—Ports of Chimbote and Casma.

Scale 1 : 590,000.

open sea. The sandy surf rolling landwards develops graceful curves which reproduce on a large scale the symmetrical oval of the shore-line.

Off the Peruvian seaboard the marine bed slopes rapidly down to great depths; hence there are scarcely any islands, and even these are little more than

headlands detached from the mainland by erosion. South of the promontories terminating in the Punta Pariña and Punta Aguja capes the surface is studded with the two little insular groups of Lobos de Tierra and Lobos de Afuera. These are followed by others lying nearer to the shore, such as the Guañape, Huaura, Pescadores d'Ancon, San Lorenzo, and Hormigas de Afuera clusters, and lastly the Chinchas, so important before the exhaustion of their rich guano-beds, but now valueless except for the shelter they offer to the harbour of Pisco. The other reefs fringing the coast farther south also contained similar deposits, some of which are still worked. Some 210 miles off Punta Aguja an island is reported to have recently appeared above the surface, but the statement awaits confirmation.

III.

Rivers—The Santa and other Pacific Streams.

In their hydrographic aspect the two slopes of Peru present a striking contrast, entirely due to the climate—on one side feeble watercourses, usually dry in their lower reaches, on the other a superabundance of running waters descending through various channels to the mighty Amazons. In the extreme north the Achira, fed by numerous torrents from the Loja heights, still reaches the sea in an exhausted state; but the Rio Piura, which follows next southwards, is entirely lost in the riverine plantations and the sands of the lower plains. Other *quebradas*, or river gorges, occur on the outer slope of the Cordillera; but none are perennial except the Santa, which differs from most other Peruvian coast streams in that it rises, not on the western slopes, but in a longitudinal valley in the very heart of the Andes.

After escaping from the Aguach lagoon (13,850 feet), the Santa is joined by the emissary of the still larger Cono-cocha basin (12,930 feet), the united currents flowing from south-east to north-west along the bed of an enormous fissure dominated by both parallel ranges. At the foot of the Andean giants, Hualcan, Huascan, and Huandoy, the Santa receives several contributions from the eastern plateau, rising close to the headwaters of the Amazon, and forcing their way in deep ravines through the Western Cordillera. After its junction with the Rio de Manta, one of these torrents from the plateau, the mainstream turns westwards to the gorge through which it escapes seawards. Beyond the gorge it occasionally discharges an enormous volume, so that during the floods it is difficult to cross, and presents great obstacles to traffic on the plains. The Santa is at times joined just above its mouth by the intermittent Lacramarca coast stream.

The Rimac, another of these coast streams, owes its celebrity to the city which it traverses, and which bears the same name under the modified form of *Lima*, that is, the "Speaker," in reference to a temple on its banks famous for its oracles. The Rimac rises in the Sierra at the Antarangra Pass (15,600 feet), within thirty

paces of the source of the Pachachaca, headstream of the Ucayali affluent of the Amazons.

South of the Rimac follow several equally impoverished coast streams, mere quebradas or wadies, usually with insufficient water even to irrigate the riverine tracts. This description even applies to the so-called Rio Grande, which, despite its name and its numerous branches, has scarcely enough water to moisten its sandy bed. South of the Rio Grande some of the rivers rising in the inter-Andean valleys, the Mages amongst others, have at least a very long course out of all proportion to their discharge.

In some of the apparently dry fluvial beds the natives, acquainted with the nature of the soil, are able to follow the course of the current percolating below the surface and utilise it for their plantations. In several of the maritime districts, and especially between Ica and Pisco, the hollows between the dunes are moist enough for the formation of the so-called *mahamaes*, deep, broad trenches forming little garden plots. Here are grown dates, grapes famed along the whole of the Pacific seaboard, prime melons, various other fruits and vegetables, besides wheat and large crops of fodder. Some of the mahamaes are very extensive, while the water in others is brackish, in which case the effect of the salt is neutralised by thick layers of the leaves of the *huarango* (*acacia punctata*), common in the country.

The Amazonian Affluents—The Marañon.

On the Amazonian slope the rivers, so far from running dry in their lower valleys, increase continually in volume. Thanks to the abundant rainfall every rivulet has here a larger volume than the most copious streams on the Pacific side. The whole region is comprised in three secondary basins—those of the upper Marañon, the Huallaga, and the Ucayali, all entirely within the Peruvian frontier, besides a few affluents of the Purus and the Madeira, rising at the foot of the Carabaya Andes on the eastern plains.

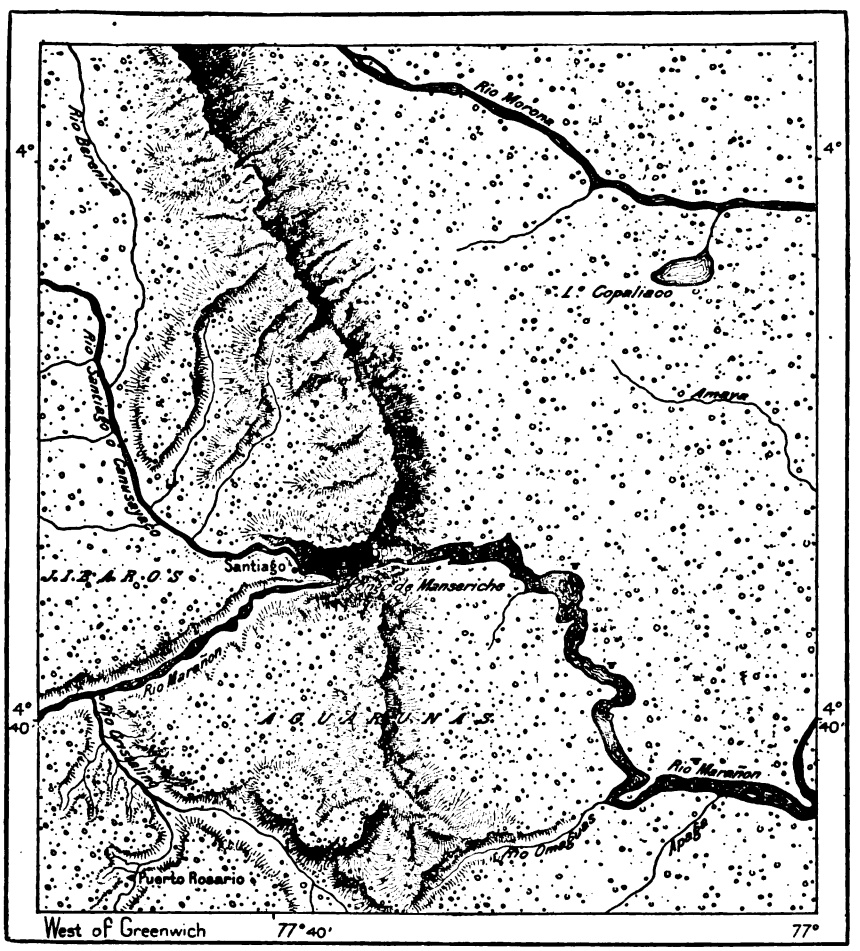
From the standpoint of physical geography, however, these various tributaries of the Amazons belong to the Andean region only in their upper courses, where they are obstructed by cascades and rapids. The true periphery of the Peruvian highlands is thus indicated in each fluvial basin by the zone of free navigation. Hence the extreme importance taken in the economic geography of the country by the various "gateways" where the Amazonian rivers escape from the Peruvian uplands to the plains. These are the vital points where one day will be effected all the exchanges in the traffic of the Andean regions with the eastern world.

The upper Marañon, formerly Tunguragua, is commonly regarded as the main upper branch of the Amazons, not for its volume, but because it prolongs farthest in the direction of the Pacific the longitudinal axis of the valley. It rises between the Andes and the Western Cordillera in the little Lake Lauri-cocha (Yauri-cocha), a basin about three miles broad which floods the bed of a cirque encircled by steep schistose cliffs. Escaping from this basin through narrow winding gorges spanned

here and there by the so-called "Incas' bridges," the Marañon is soon tripled in volume by the Napo, from the slopes of the Cordillera, below the confluence of which it trends north-west as if to fall into Guayaquil bay. For a distance of nearly 600 miles it continues to traverse the deep longitudinal valley of the Andes, swollen by a lateral torrent at every gorge opening from the mountains on

Fig. 112.—Pongo de Manseriche.

Scale 1 : 1,000,000.



Gold-mines.

25 Miles.

both banks. Here again the narrows are spanned by suspension bridges made of *huaros*, *oroyas*, or other lianas, though most of the tracks on the opposite sides are connected only by *balsas*, or rafts formed by three or four trunks of trees firmly lashed together and boarded over. All these ferries are called *puertos*, "ports" or "harbours," like those on the seaboard.

After receiving the Chinchipe, which prolongs the Andean trough in the direction of the Loja heights, the Marañon trends round to the north-east and then to the east through a series of fissures piercing the Andes and their foothills. At the beginning of the eighteenth century the walls of one of these fissures are said to have collapsed, completely damming the stream for several hours. At this point it is joined by the Paute (Santiago, or Canusa-Yaco), which would seem destined to become the chief fluvial valley between Guayaquil bay and the banks of the Amazons.

An obstruction, however, still exists below the confluence, where the stream contracts from 270 to 86 and then to 55 or 60 yards between its rocky walls 1,300 feet high, and beneath a dense overhanging vegetation through which but a dim light penetrates to the swirling waters below. In a few minutes boats and rafts rush down this gorge, over a mile long, which separates the *Marañon serrano* ("Marañon of the Mountains") from the *Marañon llanero* ("Marañon of the Plains"). Above the Pongo de Manseriche,* as these narrows are called, the stream is navigable for very light craft; below, that is, 410 feet above sea-level, the Marañon is already accessible to steamers, which have a clear waterway of some 2,450 miles from this point to Para. In their passage down the Pongo boats run some risk of being dashed against a rocky islet detached from the schistose walls, or, escaping this danger, of being engulfed in the eddies formed by the underwash of the overhanging cliffs. During the heavy floods, snags swept down with the current disappear in large numbers in these whirlpools, and according to the natives, ever lovers of the marvellous, the shattered fragments never return to the surface.

Below the Pongo begins the erratic course of the stream, meandering through its own alluvial deposits, where it has left traces of old abandoned beds, blind channels, swamps and backwaters. Even lakes are formed, especially in the neighbourhood of the affluents joining the mainstream through transverse *furos* or *caños*. From the northern Andes descend the Morona, the Pastaza, the Tigre and the Napo; from the south, the Huallaga and the Ucayali; all of which have their confluences within Peruvian territory. It might have seemed natural to change the name of the river at the point where it changes its regime; but, according to general usage, the Marañon does not become the Amazons till the junction of the Ucayali, which, owing to its longer course, is regarded by many geographers as the true upper branch. But such distinctions are frivolous, the main artery being determined by the whole system of ramifications.

The Huallaga and Ucayali.

The Huallaga, *i.e.* "Great," rises south of the Lauri-cocha, near Cerro de Pasco, in the same group as the upper Marañon itself. But it escapes more rapidly from the entanglement of the mountains, and after piercing the barrier of the Andes and skirting its eastern base, it descends through "forty-two" rapids

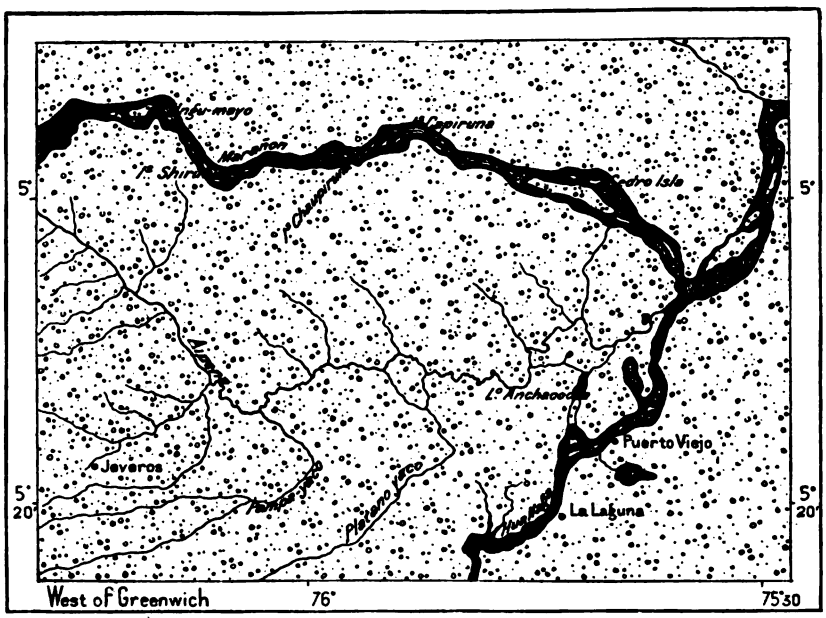
* *Pongo* is the *puncu* of the Quichuas, meaning "gateway."

between the wooded hills and cliffs. The Moyo (Mayo), its chief affluent, rises in a valley of the foothills and joins its left bank above the gorge where are developed the last cataracts. The Indian boats ascend easily to this obstruction; but laden steamers have to stop during the season of low water at Laguna, some 25 miles below the confluence. Even here there is no lack of water, but the navigation is endangered by abrupt windings, reefs, snags and the rapid current.

The copious Ucayali, although even less utilised for traffic than the Huallaga, owing to its greater distance from the inhabited plateaux, possesses a far more extensive system of tributaries, and promises one day to become the chief highway of trade. The term Ucayali, meaning "Confluence," belongs only to the

Fig. 113.—Marañon and Huallaga Confluence.

Scale 1 : 900,000.



lower course, and every special branch has its distinct name, the whole hydrographic system being formerly known as the Paro, or Apo-Paro, "Great River."

The same Pasco group which, on its north side, gives rise to the Huallaga also sends some torrents to the Ucayali basin. But these headwaters flow southwards, losing themselves in Lake Chanchay-cocha (Junin), remnant of an old inland sea, and, next to Titicaca, the largest reservoir on the Andean plateau. This lake, which is almost entirely surrounded by forests of reeds, is drained by the Ancas-yacu, "Blue Water," which first flows north-westwards, and then, under the name of Acobamba, or Rio Jauja, descends south-east parallel with the Andean axis. Beyond a narrow gorge, excavated in the thickness of the plateau,

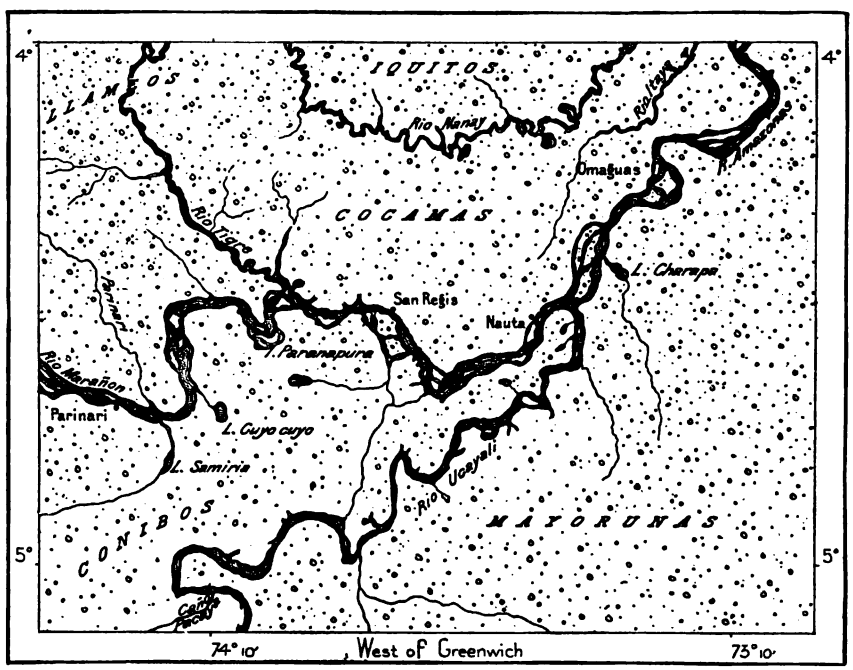
it reverses its course as far as another fissure, through which it pierces the eastern range east of Huancayo.

Beyond the mountains the Acobamba takes the name of Mantaro, and at Pisquitini joins the right bank of the Apurimac, the "Boisterous," which also flows in a longitudinal valley parallel with the Andean escarpments, and which is joined by the Pampas and other tributaries descending in abrupt windings and deep gorges between the mountains and plateaux. Below the confluence the united waters of the Mantaro and Apurimac become the Ene or Eni, that is, "Great River" in the Campa language.

On the plains the Ene is joined by the Perene, which, although only one of the

Fig. 114.—Marañon and Ucayali Confluence.

Scale 1 : 1,600,000.



secondary streams of the basin, is perhaps the most important from the economic point of view; its valley forms a prolongation of the road between Lima and the plateau, while its lower course, navigable for a distance of some 12 miles, offers the shortest route to the Amazons. After its junction with the Perene the Ene takes the name of Tambo, which beyond a last spur of the mountains intermingles its waters with the Quillabamba to form the great Rio Ucayali.

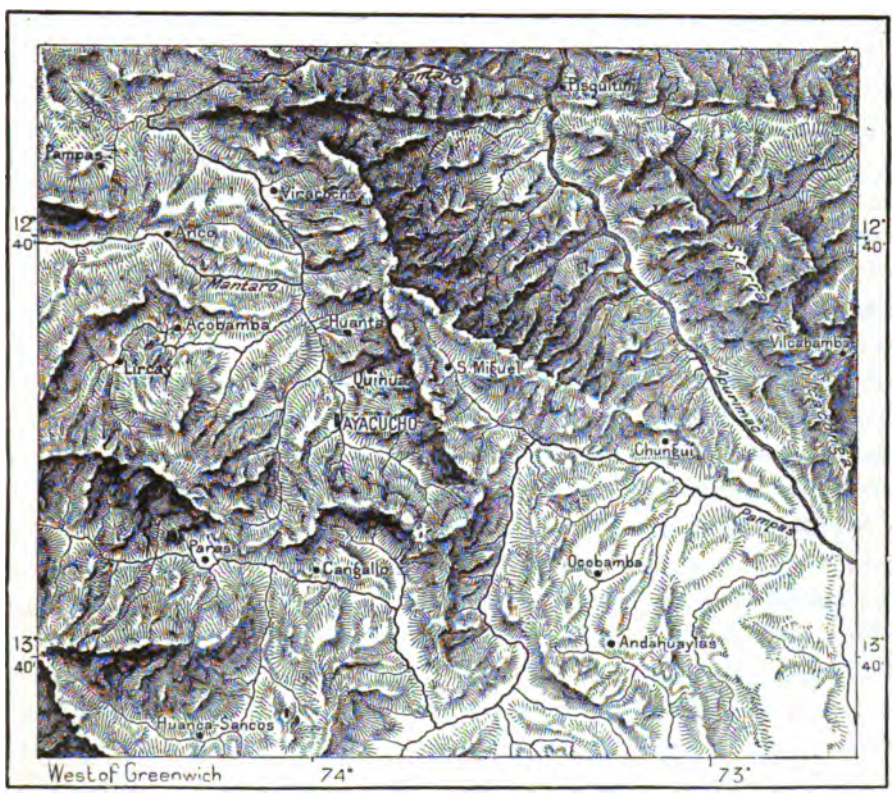
The Quillabamba, flowing in a line with the lower valley, may be regarded as the main upper branch of the system. Its chief affluents, the Paucartambo and the Urubamba, the latter rising at the Raya Pass, are also disposed in the

direction from south-east to north-west, enclosing right and left the Carabaya Andes and their prolongations.

A well-marked parting-line between two perfectly distinct fluvial systems is indicated by the confluence of the Tambo with the Quillabamba at an elevation of 860 feet above sea-level. Above the confluence the streams are in the nature of mountain torrents, rushing wildly between their rocky walls, or disappearing in deep romantic gorges; below the mainstream flows sluggishly in a broad winding channel, whose banks are everywhere covered with continuous forest growths. In

Fig. 115.—Mantaro, Pampas and Apurimac Valleys.

Scale 1 : 2,000,000.



this section of its course the Ucayali, still within the political frontiers of Peru, although presenting the normal aspect of the Brazilian rivers, is joined by only one considerable affluent, the Pachitea, which is swollen by the Palcazu, and, like the Perene, appears destined to become one of the main commercial highways of Peru.

All these watercourses descending to the Ucayali and to the Huallaga have been the object of numerous hydrographic surveys by Tucker, Werthemann and other engineers in the service of Peru. At the Mantaro confluence the Apurimac has a mean discharge of about 42,000 cubic feet per second.

IV.

Climate.

The Peruvian climate is more temperate than might be expected from its tropical position between 3° and 18° south latitude. Thanks to their great elevation, the inhabited regions enjoy a temperature resembling that of the lowlands in higher latitudes; even on the coastlands in the immediate vicinity of the sea the heat is lower than under corresponding latitudes elsewhere, being tempered by the influence of the marine current setting steadily from the Antarctic Ocean towards the equatorial waters.

The "Humboldt Current," as this stream is called, in honour of the great traveller and physicist by whom it was first observed and described, contains a liquid mass some hundred miles broad and of enormous thickness. The soundings of the *Romanche* have shown that the temperature falls rapidly down to the bottom, undisturbed by any counter-current of warm water. In fact, it is the lower strata which, by continually returning to the surface, tend to modify the normal heat of the coastlands, for they are as cold at Callao as at Valparaiso, 21° of latitude farther south. Under the action of the south-east trade winds the surface waters are driven seawards, while near the coast the void thus created is filled by the cold layers rising from the lower depths.

The mean temperature, which increases slowly in the equatorial regions, only reaches 59° or 60° Fahr. off the coast of Lima; hence it is some 18° below the normal heat of the oceanic waters at a distance from the seaboard. Speaking generally, the atmosphere above the marine current is scarcely warmer, and thus refreshes by several degrees the coastlands exposed to its influence. Lima, situated near 12° south latitude, a little nearer to the equator than Bahia on the opposite side of the continent, enjoys a perceptibly more temperate climate.* The fogs in which the maritime plains of Peru are shrouded for a great part of the year also tend to temper the heats. In winter the south wind is occasionally replaced by a northern monsoon; which, however, never blows in high gales, so that the surrounding waters remain, if not calm, at least amongst the most tranquil of the "Pacific" Ocean.

But if the Peruvian seaboard is exempt from the torrid heats of coastlands lying under the same latitude, the Andean uplands enjoy a much warmer climate than might be supposed from their great altitude. In this respect the climate of Peru is unparalleled in the whole world. Usually there is a fall of 1° Fahr. for about 328 feet of increased altitude; but on the Andean slopes the average is no more than 1° for every 935 feet. Thus the climate of Lima is entirely local, while the isothermal lines of the higher regions correspond to those of the African mountains. †

In Peru the normal trade wind, which in the torrid zone usually blows from

* Mean temperature of Lima (12° 3′ S. lat.), 67° Fahr.; of Bahia (12° 58′ S. lat.), 77° Fahr.

† John Ball, *op. cit.*, p. 100.

east to west, finds free play only on the Montaña and the Amazonian slopes. Here it reveals itself in the moisture-charged clouds which it brings from the Atlantic, and which precipitate such an abundant rainfall on the upland valleys. Beyond the mountain barriers, over which it throws a snowy mantle, it penetrates to the plateau through breaches in the outer rampart, and thus reaches the eastern slopes of the successive ranges of Cordilleras, all of which receive their share of moisture in the form of snow or rain. But the intervening valleys remain dry, and travellers crossing the Puna meet by the wayside the carcasses of pack-animals mummified in the dry cold air without showing any symptoms of decomposition.

After surmounting the Western Cordillera the trade wind ascends into the higher atmospheric regions, returning to the surface of the ocean at distances of from 120 to 600 miles from the seaboard, according to the seasons and the nature of the coastlands. Thus the intermediate spaces are again withdrawn from the influence of the regular winds, and here the aerial currents set in diverse directions. The light winds come especially from the high seas, either as return currents of the trade winds striking the ocean far seawards, or as southern breezes following the Humboldt current northwards. These cold breezes from the polar seas are attracted landwards by the relatively high temperature of the littoral plains and deserts.

But the eastern rain-bearing clouds are intercepted by the crests of the cordillera, while the marine breezes have too restricted a range to take up moisture to the point of saturation; thus it happens that the Peruvian coastlands receive very little rain, and certain districts, especially those that have earned the title of "deserts," near Tumbez, south of Piura and Sechura, on the plains of Ica and the pampa of Tunga, come altogether within the rainless zone. When Boussingault visited the northern coasts of Peru in 1832, no rain was said to have fallen at Chocope for eighty-eight years.

Nevertheless, the cordillera is low enough in these regions, which correspond to the axis of the Amazons valley, to allow occasional passage through their gaps to the moisture-laden trade winds. On such occasions the wilderness bursts into verdure, and is brought by the inhabitants under temporary cultivation. But twenty or thirty years pass in the Peruvian deserts without a single shower, and the brazen firmament is unrelieved by the endless forms of shifting clouds which form the glory of the skies in most other regions of the globe.

Hazy masses of vapour, however, are seen in the distance hanging over the *Ceja* of the Sierra, and at sunset these vapours reflect the flashes of lightning from storms too far off for their thunder to be heard. After a tempest in 1803 sixty-four years passed before the rattle of thunder was again heard by the citizens of Lima. But towards the end of 1877 a fierce thunderstorm burst over the place, accompanied by such a deluge of rain that it was feared it might be completely washed away. A certain coincidence is said to have often been observed between such downpours and the underground disturbances.

Despite the lack of rain, the beds of the coast streams are not always waterless; in the region about their source they are fed by the snows of the cordillera, while

the sea-breezes, which are too dry to precipitate any moisture on the plains, at times discharge torrents on the higher slopes, where the pressure of the aerial masses extracts the rain as from a vast sponge. During these sudden downpours the porous and friable clays on the slopes are transformed to huge masses of mud, which rush like avalanches down to the gorges, where they move steadily forward, absorbing the lateral rivulets, and sweeping away the trees, plantations and houses along their passage.

For six months, from April to October, a moist tepid fog hangs over the low-lying Peruvian coastlands, especially in the Lima district. Towards October and November the vapours lift and become light enough to admit the solar rays. At times, particularly in August, the essentially foggy month, it is dense enough to precipitate a kind of dew, locally called *garúa*, which farther inland is replaced by rain. Tschudi mentions certain plantations where the garúa and rainy zones are separated by a single wall.

The general lack of moisture facilitates the development of saline efflorescences wherever the air is too dry even to form dews. South Peru, though in a less degree than in the provinces lately annexed to Chili, abounds in chemical substances, such as gypsum, salts and nitre, and deposits of *cachi*, or native salt, occur in every part of the country, even on the inter-Andean plateau, associated in many districts with layers of *caliche*, or nitrate of soda. Certain coastlands might be compared to flights of marble steps, being disposed in successive terraces covered with white saline particles. To the same absence of moisture must be attributed the formation of the guano-beds, which were formerly so valuable, and which could never accumulate in regions enjoying even a moderate rainfall.*

V.

Flora.

The Peruvian flora, varying with the climate, is represented on the rocky and argillaceous coastlands by a few grey plants and open scrub; by a richer and greener vegetation on the western slopes exposed to damp fogs and even rains; by a great variety of species in the inter-Andean regions, but diminishing in number and size with the altitude; lastly by a boundless exuberance of growth on the Montaña, where nature reveals herself in thousands of forms not yet fully known to science. As elsewhere in the Andean regions, the botanical zones are superimposed, but with a few overlappings due to local contrasts of soil and climate.

Amongst the native species the order of compositæ is best represented, especially by the sunflowers, a family characteristic of the New World; in some

* Meteorological conditions of some Peruvian cities:—

	Latitude.	Altitude. Feet.	Mean Temperature.	Rainfall Inch.
Lima . . .	12° S.	544	65° F.	1½
Arequipa . .	16° 24′	6,650	63°	?
Cuzco . . .	13° 30′	11,390	60°	?
Cerro de Pasco .	10° 55′	14,280	51°	?

districts the mountain slopes seen from a distance assume a golden aspect from the multitude of yellow marguerites. Vast spaces on the elevated plateaux are occupied by the so-called *pajonales*, herbaceous tracts called also *ichales*, from the prevailing *ichu* (herbs). Extensive stretches are also covered with resinous shrubs called *tolas* (*boccharis*), a true type of sociable plants, while the *giganton* cactus creeps up to the vicinity of the snows. According to Wolf, the upper limit of forests and shrubs has diminished during the historic period, owing to the fires kindled by the shepherds.

Although not exclusively confined to this region, the coca (*erythroxylon coca*) was first studied in Peru and Bolivia, and it is still chiefly gathered in the Montaña of Huanuco and Cuzco. After the native reports of its marvellous properties had long been received with incredulity, the *khokha*, or "shrub" in a pre-eminent sense, as the Aymaras call it, has at last found an honourable place in the European pharmacopœia. Its masticated leaf really allays hunger and thirst for a certain time; it sustains the miner in his hard work beneath the surface; it helps the alpine climber to resist the baneful effects of mountain-sickness; and as a local anæsthetic possesses sovereign virtues. When crossing the Andes the Indian carriers always reckon their marches by *cocadas* (*acullicos*), so many balls of coca, just as elsewhere the time is often measured by so many "pipes." The effects of these doles, distributed at the stations to each carrier, are usually felt for about 40 minutes, and a good day's march with a load of four arrobes (100 pounds) is calculated at from six to eight cocadas. Against pulmonary affections the natives also employ the *huamanripa* (*cryptochæte andicola*), a plant of the snowy regions, scarcely yet known in European medicine.

The Peruvian rubber, different from that of Brazil, is extracted from the *syphocampylus*, a plant about 50 feet high, which contains a very large quantity of milky sap. The liquid obtained by incision coagulates at contact with the *sacha-camote* liana, and is formed into cakes of a greyish colour, which blacken on the surface. A tree in its prime yields from 30 to 34 pounds, which is extracted for about tenpence in the forest, and sold for from 40s. to 50s. on the Quito market. The plant is always "bled to death," and its regular cultivation is said to be impossible owing to the worms which attack it on the least incision and cause it rapidly to decay. Saplings springing from the felled tree take some fifteen years to arrive at maturity.

Amongst the most remarkable species of the Amazonian woodlands is the *tamai caspi* (*pithecolobium samam*—Ernst), the "rain-tree," which grows in the neighbourhood of Moyobamba, and attains a height of 60 feet. It absorbs the atmospheric moisture, especially in dry weather, in such quantities that the leaves keep constantly dripping, changing the surrounding soil to mud.

Fauna.

Like its flora, the Peruvian fauna corresponds with the climatic conditions. Extremely diversified on the Montaña, it is poor on the Pacific slope, and displays

its most original features in the intermediate regions, where the species, confined to narrow areas, present sharp contrasts resulting from the varying environment.

In the coast zone Tschudi enumerates only 26 species of mammals, the most remarkable comprising the group of "American camels" (*auchenia*)—llama, huanaco, alpaca and vicuña. Of these the most celebrated is the llama, which the Quichuas had domesticated from such a remote period that no representatives of the species are anywhere found in the wild state. The llama is used almost exclusively as a pack-animal, although it figures on the old potteries as a mount.

The male, which is alone employed, carries an average load of from 45 to 90 pounds, and covers a day's march of from 12 to 18 miles. The poorest fodder suffices to nourish the llama, whose wool is woven into coarse fabrics. The animal, which is extremely sensitive, requires to be treated with the utmost kindness. The slightest blow, or even a harsh word, would cause it to lie down by the wayside, and then neither prayer nor abuse would induce it to resume the march. At dawn the llama turns to the east and salutes the sun with a low bleating, "a sort of worship which was, perhaps, not without its influence on the religious instincts of the Peruvians." *

All the other species—vicuña, huanaco and alpaca—still run wild, although perfectly successful attempts have been made to tame them. The fleece differs greatly in value according to its texture, length and colour. The fur of the huanaco is highly prized, and from the hair of the alpaca extremely light and glossy fabrics are made.

At the time of the Conquest the vicuñas, which under the Incas were preserved as game, roamed the upper regions in vast flocks. But the Spaniards spared neither game nor hunter, and the pasturages were soon thinned. Thousands were slaughtered for the sake of the brain alone, although they are still numerous enough to be hunted by organised battues, as in the time of the Incas, who regarded the vicuña as their exclusive property. But all the wild species must soon disappear, exterminated by sportsmen, unless, like the llama, domesticated for the service of man.

Other fur-bearing animals range up to the neighbourhood of the snows, and even beyond the snow-line. Such are the chinchilla and the viscacha, both rodents, dwelling in the recesses of the rocks. The fur of the former is much prized, while that of the latter, though thick and soft to the touch, commands such a low price that hunters take little trouble to trap it.

The fauna of the Montaña comprises nearly all the species of the vast Brazilian zone extending from the Orinoco to the Plate River. Of birds there are hundreds of forms, all of which here find a suitable environment. On the Pacific slope there are but few bird-forms, and some of these, such as the parrots, adapt themselves to the changed surroundings, dwelling in the clefts of the rocks, so different from their leafy homes in the Amazonian woodlands. One species in the Lima district (*conurus rupicola*) has even acquired troglodytic habits.

* Philibert Germain, *Actes de la Société scientifique du Chili*, 1891.

Along the beach, especially at Huacho, crawfish are taken by the million. The neighbouring waters also teem with fish, which in their turn attract myriads of penguins, petrels, cormorants, and other aquatic fowl.

VI.

Inhabitants of Peru.

As in pre-Columbian times, the Quichuas are still the dominant people of Peru. The term *Quichua*, said to mean "temperate climate," served originally to distinguish the habitable plateau region from the desert *Puna* of the snowy highlands, and then was extended to a whole section of the inhabitants. But according to another etymology the Quichuas are the "men of understanding," those who "speak well," and in any case their language is still dominant amongst the Peruvian population. It is, however, subdivided into several quite distinct dialects, such as that of Ecuador, which is unintelligible to the people of South Peru. The pronunciation, which is very soft in the northern regions, becomes guttural and complicated with explosive letters in the south, and is also affected by Spanish and Aymara elements in varying proportions.

The national speech has been best preserved in Cuzco and the surrounding district, where the natives held out longest in defence of their political independence. This idiom is often spoken of as the "language of the Incas," because employed by those potentates. They must, however, have themselves learnt it from the nation, and the general name of the people should also be that of their language. At the same time they may have affected a form of speech somewhat different from that of their subjects, and, in fact, it is stated by the early chronicles that the court of Cuzco had its special idiom.

Clements Markham quotes several words apparently answering in sound and sense to corresponding Sanskrit terms, and he seems half inclined to accept such coincidences as pointing to a Hindu origin of the old masters of Peru.* But, as they said themselves, they came from the shores and islands of Lake Titicaca, that is to say, from an Aymara land. It may therefore be assumed that Aymara was their mother-tongue.

Quichua, formerly prevalent throughout Tahuanti-Suyu, as the Inca empire was called, is still current in all the provinces of that state forming part of the present republics of Ecuador, Peru, Bolivia, Chili and Argentina. In these western regions it is the *lengua general*, corresponding to the Tupi-Guarani, which is the *lengoa geral* of Brazil, Paraguay and Corrientes, that is, of the eastern section of the southern continent. This "general language" of the Andean uplands, the mother-tongue of two millions of people, has held its ground in all the lands where it had been introduced by the Incas. In the rural districts of the Sierra it is nowhere yielding to the encroachments of Spanish; but, on the

* Clements R. Markham, *Cuzco and Lima*.

contrary, the Spaniards themselves learn Quichua, and usually speak it in the family circle in preference to their own. Several Quichua terms, such as *pampa*, *llama*, *condor*, *guano*, *quina*, have entered into the universal speech of cultured peoples.

But, despite its hard struggle for existence, there can be little doubt that Quichua must eventually yield to Spanish, which is the speech of the dominant urban populations, of literature, commerce, and contemporary civilisation. Quichua is a remarkable language in several respects, and may be taken as a type of the South American agglutinating tongues. Thanks to the facility of composition, it is extremely rich and pliant, capable of expressing with ease the subtlest shades of thought, not by inflections of the root, as in the Aryan system, but by particles loosely attached to the word. Both subject and object are incorporated in the verb, and in conversation the two speakers are clearly indicated by the formal elements.

Fig. 116.—Empire of the Incas.

Scale 1 : 37,000,000.

Between the years 1560 and 1754 no less than ten grammars and dictionaries were published, all but one at Lima. Quichua also possesses a copious literature, including the *Apu Ollantai*, an ancient drama in several texts, relating the feudal wars of the Inca empire. Markham has also brought to light the *Usca Paucan* ("Loves of the Golden Flower"), a tragedy which has unfortunately been tampered with in the extant copies made by the missionaries, who have introduced the Madonna, angels, and Catholic miracles.

Quichua letters continue even still to be enriched by fresh works. Besides devotional texts and satirical songs, in which Spanish and the native language are intermingled, elegies and other poems, mostly pervaded by a melancholy spirit,

are frequently composed, and usually designated by the name of *yaravis*. These songs, which are accompanied by the plaintive notes of the *quena* (flute), speak more eloquently than all the historians of the horrors of the Conquest and the sufferings of the oppressed natives.

The Quichuas—Empire of the Incas.

The Quichuas and the kindred Peruvian populations resemble the Aztecs and other Mexicans of the plateaux in the massive build of their frames, the broad chest, round and pyramidal form of the skull, a feature which was formerly exaggerated by artificial deformation. A curious racial characteristic is the presence in the cranium of an inter-parietal bone, the so-called *os Incæ*, which occurs far more frequently amongst the Quichuas than amongst European races. The complexion is generally olivaster, and the features are strongly marked, as is usual amongst highlanders.

They are a timid, peaceful people, in whom the family sentiment is highly developed; but the majority yield readily to the passion for strong drinks, passing days together in a brutal delirium, accompanied by wild dancing and other orgies. Like all descendants of conquered and enslaved peoples, they lack dignity, defending themselves with the weapons of flattery, cunning and falsehood, and even at times displaying a cruel and ferocious spirit.

The servile sentiment is deeply ingrained in the Quichua, who obeys uncomplainingly, and if he ever rises against intolerable oppression, does so not in the name of his outraged liberties, but through a sense of loyalty for his old Inca masters. All the Indian revolts and wars of emancipation have been made with a view to restoring the past. Raimondi relates the story of a native of the Rio de Santa district, who, when driven to take vengeance on a parish priest, exchanged his "Christian" clothes for the costume of an Inca, and then slew his enemy.

The Quichuas and the other Indians of the Andean uplands had certainly reached a highly developed state of culture several centuries before the arrival of the Europeans. The most remarkable monuments on the coastlands are even attributed to peoples who preceded the Quichuas in that region. In any case, they were by no means the only nation that made progress in the arts, in which they were rivalled and even distanced by others. Viewed through a long historic perspective, to us they may seem to have always been what they showed themselves when the Inca rule was suddenly overthrown by the Spanish Conquest. But there is reason to believe that at that time they had already entered a period of complete decadence. The genius previously displayed by various inventions could scarcely have been developed under a political system which crushed all personal enterprise.

As skilful potters, the Quichuas made fictile vases of diverse form, representing symbolic or grotesque figures of men and animals. They also knew how to utilise the mineral ores, smelting gold, silver and copper, and even extracting quicksilver. They could solder the metals and manufacture arms and other implements, but were still at the copper age, having no knowledge of iron. Their cotton and woollen

fabrics were far more durable than those at present imported from Europe, and were coloured with fast and brilliant dyes.

In engineering they executed great works. Not only in the Sierra, from Ecuador to Bolivia, but near the coasts, there still exist hundreds of their structures, *huacas* (graves), dykes and embankments, bridges, temples and fortresses. Such is the Ollantaï-tambo, "House of Ollantaï," celebrated in the most valuable literary document of Peru. On a limestone rock, towering above the Vilcamayo valley north-east of Cuzco, stand the unfinished walls of the renowned citadel, on which thousands of hands had been employed for a period of ten years. Enormous granite slabs project above the buildings, while others, the so-called "tired stones," lie abandoned on the road from the quarries some six miles distant. The observer stands amazed at the prodigious labour involved in the transport of these huge monoliths across a roaring stream, and up steep, rugged slopes. His wonder is enhanced by the marvellous finish of these blocks, hewn without the aid of iron, and polished by the friction of other stones and of plants with silicious integuments.

The high state of culture attained by the ancient Quichuas is also revealed by their bridges and highways. In this respect they were unrivalled in the New World, except perhaps by the Mayas; and even in the Eastern Hemisphere they had been surpassed by the Romans and the Chinese alone. Their roads, all laid down in a straight line, avoided any such unsurmountable obstacles as lakes and precipices, but were carried over swamps, ascended steep inclines, and in places were cut out of the live rock. The causeways, strengthened by a layer of *pilca* (concrete), resisted the action of frosts and rains, and were kept in repair by gangs of "navvies," stationed at intervals along the route. Llama enclosures for the transport service were also maintained at fixed stations, and tambos (*tampu*, "shelters") were erected at the passes and on the more difficult slopes.

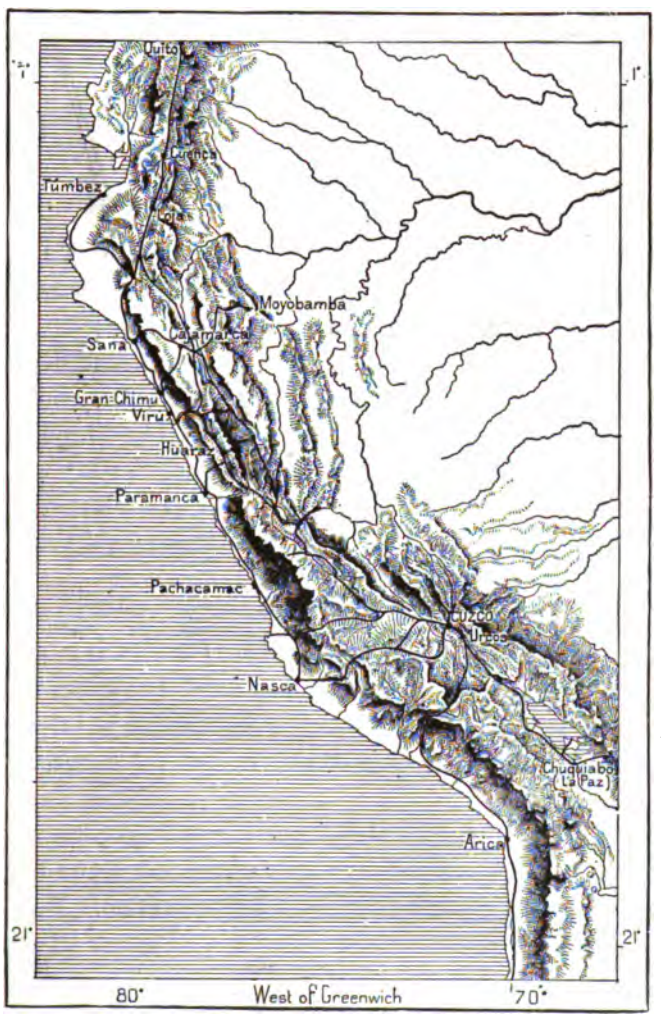
Stone bridges, some of a monumental character, still exist, spanning the narrower streams, while the broad watercourses and rocky defiles were crossed by means of the oroyas, basket-chairs, swung in mid-air on the liana suspension bridges. There can be no doubt that, in the interior of the Sierra, Peru, being better provided with roads, was formerly far more accessible than at present. Hence, during the last four centuries, there has been a retrogade movement in this respect, despite the infusion of new blood. But even under the Incas, these highways, which ramified in all directions throughout the empire, at last became useless in the economic life of the nation. They had been transformed to an instrument of despotism, along which the *chasqui*, or "carriers," were organised to keep up the communications between Cuzco and Quito, and from the plateaux to the coast, and transmit the imperial orders from one end of the empire to the other more rapidly than could elsewhere be done by mounted messengers.

As in some modern European "republics," the subjects of the Inca were all confined to their respective districts, from which they could not stir without a special "permit." Now, however, the railways which are creeping up the Cordilleras may become disseminators of new ideas on the elevated plateaux.

Their work may thus prove more important than that of the Inca couriers, just as the steamers plying on the coast must tend to stimulate progress to an incomparably greater extent than the otherwise really remarkable Peruvian craft. These large *balsas*, or "rafts," as the Spaniards called them, were strong enough to resist the ocean waves, as we are assured by Pizarro's pilot, Ruiz de Estrada. They

Fig. 117.—Ancient Highways of the Incas.

Scale 1 : 17,000,000.



were most solidly built, with double masts, carrying broad, square sails, and not only navigated the waters near the coast, but even ventured on the high seas as far as the Galapagos archipelago, 600 miles distant from the nearest land.

Even science, in the strict sense, had made considerable progress, as is evident from their decimal system, as accurate as that of modern times, their observation

of eclipses and of the precession of the sun along the ecliptic, and their division of the year into 365 days. They were also able to transmit their ideas by certain sculptures, and the so-called "written stones," representing animals, constellations, various symbolical objects, and probably also signs of notation, are seen in many parts of the country, and especially on the cliffs in the rainless zone not exposed to weathering.

According to Montesinos they were even acquainted with the art of writing; but one of the Incas, after consulting the supreme god, had announced that letters were the cause of all depravity and of all national misfortunes, consequently that this diabolical invention should be abandoned under pain of the stake. But however this be, the Quichuas were certainly ignorant of writing at the arrival of the Spaniards, using as aids to the memory the so-called *quipos* (*quippu*), woollen cords of varying length, which, by diverse combinations of knots, red, blue, white and brown colours, were able to record events, even express a few simple thoughts, and give the results of the official census.

The Jesuit missionary Acosta tells us that the old men of his time could still represent articulate sounds by arranging pebbles of various colours on the ground. Such arrangements represented such prayers as the *Pater noster*, the *Ave Maria*, the words of which were recalled by observing the different disposition of the pebbles. The couriers, however, charged with the transmission of news and Government orders, do not appear to have been supplied with quipos, but had to learn the messages by heart, passing them on from relay to relay till they reached their destinations. At present the shepherds, fishers and workers on the plantations still keep their reckonings by means of rudimentary quipos, like the abacus of the Chinese and Russian peasantry.

The Quichuas had developed a national communistic system, which the Incas would appear to have simply codified without contributing anything to its formation. All inventions were, of course, attributed to various members of the royal dynasty. But the will of a potentate is insufficient to inform the national life; he can but legislate to his personal aggrandisement in accordance with the traditional usages.

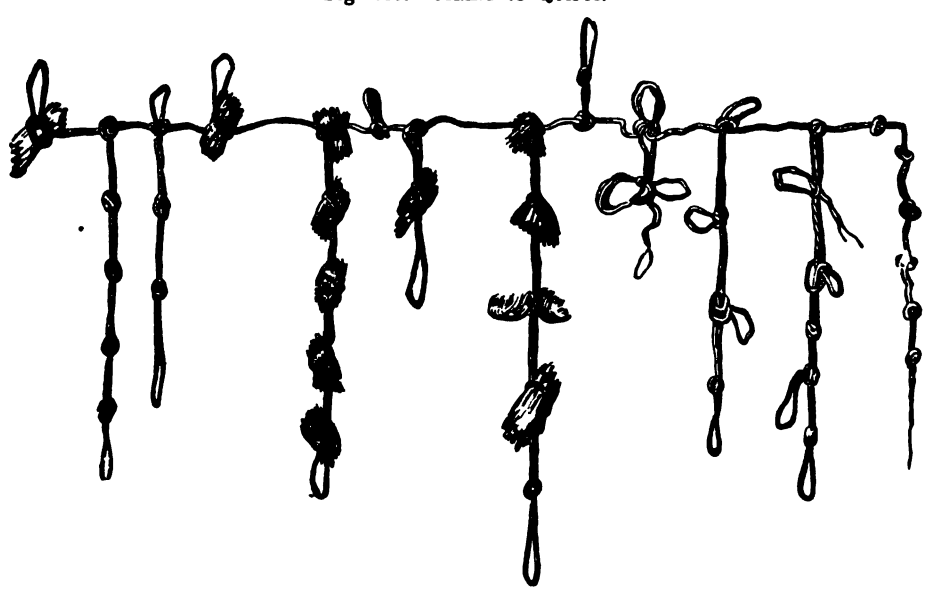
The land was divided into four equal parts, one for the labourers and their families, one for the sick, widows and orphans, and the other two for the Inca and the Sun, that is, for the political and religious administration. But being at once emperor and high priest, the Inca was, in fact, the real owner of one-half of the national domain. The alimentary crops were garnered in common, each person receiving a share in accordance with his wants. Of the harvest attributed to the Inca and to the Sun, a portion was also set apart to replenish the granaries reserved for times of distress.

The arable land was distributed in family allotments proportionate to the number of members, and all field operations were carried on under Goverment overseers. The lash was applied in public to idle or refractory toilers; but they were never deprived of their land—which, in fact, did not belong to them in personal ownership.

Besides the seed-corn, and the dole in case of famine, the State also distributed every two years wool and leather on the uplands, and cotton in the hot regions. Each family had to make its own clothes and foot-gear, also under Government commissioners, scrupulously returning all remnants to the public stores. The livestock was similarly common property; that is to say, the administration appointed the herdsmen, regulated the conditions of slaughter, and on special occasions even the distribution of meat.

All the national customs and institutions were thus transformed by the State to rigid laws, until the whole people had finally become mere serfs of the "divine" family of the Incas. Manco Capac, founder of the dynasty, was supposed to have suddenly appeared on an island in Lake Titicaca, unless he fell from heaven, like the gold, silver and copper eggs whence sprang the chiefs, the

Fig. 118.—String of Quipos.



nobles and the common people. But according to another legend the first Inca emerged from the ocean like the divine Viracocha ("Sea Foam"), whose name was transferred to the Spanish conquerors also arriving like gods from the high seas.

During the four or five centuries of the "mild sway" to which the nation was subjected it ended by adapting itself to the yoke, and obedience became "blind," as required by the laws. Even culprits came forward for the most part to denounce themselves. All men were held to military service, death being the penalty of any act of insubordination.

All conquered peoples were obliged to accept the national religion, the feasts and ceremonies of which were strictly regulated by the State; the least change in the traditional rites would, in fact, have seemed more than a crime. The public worship, however, as well as the common tenure of land, at least kept alive the

memory of times anterior to the Inca rule, and was itself intimately associated with astronomic phenomena, the movements of the heavenly bodies, the seasons and harvests.

The sun, whose rays quickened the sluggish life of the plateaux, was the God of the Quichuas in a pre-eminent sense, whereas the Yuncas worshipped more especially Mama Cocha, the "Mother Lake," whose waves, stirred up by the underground forces, came at times to waste their lands. The great chief of the Quichua cult was of royal blood, a "child of the sun," and the priests and priestesses owed him absolute obedience; even the nunneries were royal harems.

No other nation in the whole world was ever more thoroughly classified, drilled and disciplined. Every man had his badge; everywhere the people were numbered and enrolled in set divisions, which were classed in groups of five, ten and ten times ten; each hundred had its centurion, each thousand its captain, while each viceroy of the four provinces—North, South, East, and West—knew exactly how many captains were at his disposal.

The working of the vast machine was controlled by a secret police, and the education suitable to each child was likewise determined by the State. The sons of the Incas and of the "decorated gentlemen" alone were taught the arts and sciences, mathematics and astronomy, theology, history and law, politics and the art of war, music and poetry. Agriculture, the manufacture of arms, implements, and clothes comprised the education of the sons; weaving, cooking, and certain field operations that of the daughters, of plebeians.

Marriage was obligatory, its date, like that of the military service, being determined by the magistrates. All unions were essentially endogamic, even the Inca himself being compelled to marry his eldest sister. Government supervision was extended to every act of daily life, and the very doors of the houses had to be left unbolted, so that the agents of the police might have access at all hours.

All conquered nations were at once subjected to the same régime, which extended in their case to the style of dress and the cut of the hair. The different types of special cranial deformation, as found in the graves, are even supposed to have been officially prescribed to the different tribal groups. The result of all this drilling and meddlesome interference was that when Pizarro, at the head of a few Spanish brigands, presented himself before the highly-disciplined armies of Atahuallpa, seized the Inca by his embroidered robe and dragged him from his throne, the empire collapsed!

A partial destruction of the nation rapidly followed the fall of the dynasty. Massacres, epidemics, famines, swept away hundreds of thousands and even millions, say the early chroniclers. But the new economic conditions were certainly the chief cause of the mortality. Not only were the natives forcibly converted to the Christian religion, and subjected to the tribute as under the Incas but they had also to submit to the system of *mita*, requiring all to take their turn in the mines. One year of excessive labour carried off half the hands, so that the mining districts were converted into ever-increasing solitudes, while the losses were supplied by fresh importations.

Those who escaped the mita were hopelessly ruined by the accumulating ecclesiastical dues, and by the so-called *repartimientos*, a kind of enforced truck system, applied to the purchase of the necessaries of life. During the first years of the Spanish occupation many sought safety in flight. Both the chroniclers and popular tradition speak of Incas followed by thousands, laden with enormous quantities of the precious metals, who escaped from the oppressors by crossing the eastern Andes and seeking refuge amongst the allied tribes of the Amazonian valleys. According to the legend these fugitives settled about the confluence of the Huallaga and Marañon, where they built the great city of Paytiti, called also Yurac-Huasi, "White House," which in the popular imagination was often confounded with the palace of El Dorado, the "Golden King." So strong was the belief in the fugitive dynasty of the old kings that, in 1740, a certain Juan Santos was able to assume the name of Atahuallpa, rally to his standard the *Chunchos*, or savages of various tribes, massacre or expel the missionaries, and set up the empire of Emin or Paytiti in defiance of the Spanish authorities.

Although the revolts in the inter-Andean provinces were ruthlessly suppressed, the Government was for a moment endangered by the rising of 1780, when Tupac-Amaru, a descendant of the Incas, ordered all the corregidores to be hanged, abolished the mita and repartimientos, and in a few months found himself master of the greater part of the Peruvian plateau. But he was unable to resist the regular troops, and after his execution at Cuzco the natives returned to their obedience. The repartimientos, however, were never revived, and the mita was greatly modified, though not finally abolished till the War of Independence.

At present the Quichua race is scarcely anywhere found in a pure state. In the Huancavelica district it is intermingled with the Huancas, and elsewhere with the Huamanes, the Yuncas, Charcas and Antis. Besides these aborigines the Quichuas have also absorbed some European, African, and even Chinese elements, and without being fundamentally changed, they have been somewhat modified by the Spanish administration itself.

The Yuncas, Antis and other Aborigines.

Besides the Quichuas, who held most of the Sierra, the Bolivian Aymaras occupied some of the southern districts. On the hot coastlands dwelt several civilised peoples collectively called Yuncas, like the country itself, but differing greatly from each other, and probably, on the whole, superior to the Quichuas in culture and mental capacity. But occupying a narrow zone, broken into several fragments by intervening arid and desert tracts, the Yuncas were unable to resist the Peruvian armies descending from the uplands and attacking them in detail. Most of their fortified villages, still seen in large numbers on the heights along the coast, were perched on bare rocks destitute of springs, so that water had to be brought with great labour from the gorges at the foot of the hills.

Besides these ruined settlements the Yuncas have left numerous structures, such as citadels, temples and *huacas*, which far exceed those of the Quichuas

in size and architectural beauty, as well as in their wealth of metal objects, earthenware and woven fabrics. But the nation itself has been merged in the mass of the surrounding half-caste populations. One of their dialects was still current in the middle of the seventeenth century on the coastlands near Trujillo, but it now survives only in Fernando de la Carrera's grammar.

On the Amazonian slope the native populations have been protected by their hot and moist climate, their vast forests, precipices and dangerous rivers. But they have suffered especially from the epidemics introduced by the whites, and most of the villages founded by the missionaries have been depopulated mainly by these contagious disorders. Thus disappeared San Francisco de Borja on the Marañon, where the smallpox broke out in 1660 and, spreading to the surrounding missions, swept away 44,000 Indians. Nine years afterwards the same scourge carried off 20,000 fresh victims, and its repeated visits have left vast solitudes in the country.

The greatest sufferers were always the *Mansos*, "tame," or semi-civilised, enfeebled by their very change of life; hence at present the *Indios bravos*, that is the independent wild tribes, are far more numerous than the Mansos. Those occupying the east foot of the Carabaya mountains have successfully risen against the Spanish intruders, and destroyed the colonies that had been founded in their territory. All these Indians, collectively known as Chunchos, that is, "Barbarians" in the Quichua language, are probably of Antis stock.

The *Antis* proper, who have given their name to the surrounding mountains, and by extension to the *Andes* themselves, are a mere remnant of the nation. These Campas, as they are also called, are of mean stature, with more graceful figures than the Quichuas, although betraying more of a Mongolic type in their slightly oblique eyes, flat nose and prominent cheekbones. They show remarkable skill in taming wild animals, which are kept in menageries in their forest glades. Amongst these "pets" are not only poultry and other birds, but peccaries, capybaras (water cavies) and even tapirs.

The Antis have not yet forgotten all the practices which they formerly learned at the Franciscan missions. But the old religious ideas have been little modified and a belief in witchcraft is still universal. All maladies are caused by the machinations of some witch, who when discovered by a counter-spell is strangled, with the approbation of her kinsfolk. They still sing a kind of litany, the form of which was probably acquired at the old missions. But the words are very different, the Catholic formularies having been replaced by an oath of brotherhood probably dating from the time when they rose against the Spaniards.

"If you hunger, I will share with you my game and my fish and the fruits of my garden, for you are a Campa! If you are attacked by an enemy, I will expose my life to defend you, for you are a Campa! If the devil compasses your death, your children shall be mine, for you are a Campa, and the Campas should love one another."

The reiterated "For you are a Campa" produces just the effect of the "Ora pro nobis" of the Catholic litany.

Amongst the tribes that have preserved some cannibal practices are the Cachibos, a term which, according to Calvo, has the meaning of "Vampire" in the Pana language. In 1865 two Peruvian officers and their escort were eaten by the Cachibos, who also eat their relatives, smoked or roasted. They do not always wait the natural end of the aged, who at their own request are clubbed. The same fate overtakes all adults unable to support themselves, as well as childless women—though they are not eaten, the flesh of women being considered poisonous.

It is related of two sick neophytes that at the approach of death they wept hot tears at the thought that they would not have the honour of serving as food for their friends, but would be consumed by worms. At solemn feasts so numerous were said to be the candidates for this honour that the young man intended to supply the banquet had at times to be chosen by lot. It is also asserted by the Peruvians that the Cachibos and other cannibals hunted man, regarded purely as game. The white or half-caste settlers, on their part, feel themselves justified on the strength of these more or less veracious reports to treat the Cachibos as wild beasts, and massacre them without remorse. Nor are they always very particular to distinguish between the Cachibos and others, but in their hunting expeditions are apt to regard all Indians as cannibals.

Altogether the traditions of murders and massacres perpetrated in these lands are of a harrowing character. From time immemorial the polygamist tribes of the Ucayali basin—Piros, Conibos, Sipibos and Setibos—have been accustomed to ascend the lateral streams in search of women. But such *correrias* (roving expeditions) are undertaken, not on their own account, but are organised by the whites for the capture of women and children. For their purposes the adult males would be useless, as they would prefer to die than to submit to a life of slavery; hence these are usually killed and their habitations fired.

Nevertheless, some of the groups, such as the Piros (Chontaquiros), who occupy a space of over 300 miles along the Urubamba and Ucayali rivers, have already adopted civilised ways; many speak Spanish, Quichua, and even Portuguese, and show much skill as weavers, armourers and builders. Admirable boatmen, they make long voyages of hundreds of miles, often merely for pleasure.

The Conibos and Sipibos, who adjoin the Piros on the banks of the Ucayali, have even made still greater progress, wearing the dress of the Peruvian peasantry, replacing their bows and arrows and stone hatchets with firearms, importing English or American utensils, drinking foreign liquors, speaking Portuguese, and travelling by the steamers plying on the Amazons and its affluents. Nevertheless, in the recesses of the forests they still adhere to some of the old usages, such as artificial deformation of the skull, and, it is said, even occasionally bury alive badly-shaped or troublesome new-born babes. They would also appear to recruit their numbers, decimated by these barbarous practices, by kidnapping expeditions amongst the Amahuacas (Ipiteneres), who dwell in the branches of the trees and whose only weapons are the blow-pipe and arrows.

In the Huallaga and Ucayali valleys the natives, often named from symbolical

animals, speak languages radically distinct from the Quichua-Aymara family. The Piros and other southern tribes belong to the Antis group, while the Amahuacas, Conibos, Cachibos, Sipibos, Setibos, and Remos of the Ucayali, together with the Christian Hibitos (Itibos) of the Huallaga, form another group with the now reduced Panos, who formerly constituted a great nation on the lower Ucayali and Upper Amazons. The Panos manufactured a bark-paper like the Mexican papyrus, on which they were said to record memorable events and divisions of the year by means of various signs. On their amulets they also painted diverse coloured figures, which were supposed to exert a favourable influence on their destinies. They made wooden and clay effigies, decked their dead and deposited them in large painted jars, did homage to the fire, and, like the Quichuas, worshipped the sun.

Converted in the seventeenth century, they relapsed after the massacre of the missionaries in 1767, but were again gathered into the fold towards the close of the Spanish rule. According to Marcoy, the purest representatives of the old Pano nation are the Sensi, a small section of the Setibos, who dwell apart from the whites on a plateau east of the lower Ucayali. The Sensi have no chiefs, and recognise no superiors, though they pay deference to the advice of their elders.

Others, such as the Cocamas, the Iquitos, the Pebas, Ticunas and Omaguas, have either already disappeared, or are being assimilated to the surrounding settled populations. The Omaguas, of whom no pure representatives any longer survive, have played a considerable, although a passive, part in the history of South American exploration. Vague rumours propagated from tribe to tribe, and repeated to the Spanish adventurers in Colombia and Peru, represented them as a wealthy nation, in whose sumptuous capital resided the El Dorado. Numerous expeditions were organised to discover these treasures, and thus the work of discovery was stimulated.

In the forests of the Ucayali and Yavari are situated the camping-grounds of the Mayorunas, who also gave rise to numerous legends. They were supposed by some to be the descendants of the Spanish soldiers left in the country after the murder of Pedro de Ursua by the "tyrant" Lopez de Aguirre, and it was added that they still preserved their European features with thick black beards. But the Mayorunas are, on the contrary, full-blood Indians, and the legend originated in a confusion of terms. The pirates accompanying Aguirre had received the name of *Marañones*, that is, "People of Marañon," a word which came to be easily confused with Mayorunas.

But this name itself presents a difficulty. In Quichua *Mayo Runa* means "River People," whereas they are a tribe of hunters, living in the depths of the forest, without boats or rafts. They may, however, have originally come from the unnavigable headwaters of some river, such, for instance, as the Mayo, on the banks of which the Spaniards founded Moyobamba.

The Mayorunas are accused of cannibalism by their neighbours, but without any proof; they are, however, hostile, and even dangerous to whites venturing into

their territory. In 1866 a Brazilo-Peruvian expedition up the Yavari had to retrace its steps after losing its canoes and arms, and although the commissioners of 1874 were more fortunate, they lost twenty-seven of their party from fever, hardships, and the poisoned arrows of the Mayorunas.

Akin to these are the Marahuas, who dwell farther east on the right bank of

Fig. 119.—Indian Populations of Peru.

Scale 1 : 15,000,000.

the Yavari, and who are now mostly Catholics. But of all the riverine peoples above the Brazilian frontier, the Yahuas (Yaguas) are physically the finest. Both men and women have the same proud bearing, and their almost naked figures look like living statues. Their Ticuna neighbours, higher up the river, are also a fine race, who dress in excellent taste, ornamenting their robes with unsymmetrical but highly effective paintings, and at a distance resembling the conventional

figures of angels, with their long tresses and white wings pendent from the shoulders.

On the other hand, the Orejones ("Long Ears"), although tall and muscular, make themselves repulsive by slitting the lower lobe of the ear into two strips, which hang down nearly to the shoulders. Their territory lies on the north side of the Napo, above its confluence with the Marañon.

The Spaniards, Negroes and Coolies.

The Spanish immigrants, who have served to leaven the native populations, nearly all settled originally in the metropolis and in the mining cities of the plateau. From these centres the creoles (full-blood Spaniards) and the half-castes gradually spread over the land in sufficient numbers to slowly modify the aboriginal elements. But after the heroic age of the Conquest, Spain was too exhausted to send any more colonists to Peru; there never was an immigration in the strict sense of the word, and the subsequent arrivals were mainly a few fortune-hunters, officials and soldiers.

Since the War of Independence and the rupture of the commercial relations with Spain, Peru has ceased to receive any settlers of Spanish speech. Amongst the immigrants from other lands, who in 1876 constituted about one-sixth of the inhabitants of Lima, the Italians are by far the most numerous; they have acquired a sort of monopoly of the retail trade, and most of the eating-houses are in their hands. The English and Germans are for the most part engaged in the wholesale trade, while the French follow pursuits more like those of the Italians.

Under the Spanish rule the African element was somewhat strongly represented on the Peruvian seaboard. But it tends to be absorbed in the general population, especially since the complete cessation of slavery in 1855, after which year all further importations from any quarter became impossible. Towards the middle of the century there were still about 50,000 negroes in Peru; at present they number at most 5,000. On the plantations they are replaced by Chinese coolies and South-Sea Islanders, of whom nearly 100,000 have been introduced since 1849.

Whatever be said to the contrary by interested persons, the coolie traffic has always been accompanied by injustice and atrocities. The pretended free hands had often been kidnapped on the coasts of China, while those who signed the contract voluntarily discovered too late the hollowness of the promises in which they had believed. Revolts occurred on the high seas, and frightful struggles took place between the crews and the captives. Reports are current of vessels which disappeared altogether, burnt by their living freight, preferring death to bondage.

After the horrors of the middle passage came those of forced labour on the plantations. Groaning under the lash during the day, confined at night in hovels guarded by armed men, with only three days of rest in the whole year,

GROUP OF PERUVIANS.

and a vile diet, supplied at exorbitant charges by the planters themselves, those who survived the eight years for which they had signed found themselves at the end burdened with a debt of which they knew nothing, and for which they had to serve a fresh term of slavery.

Nevertheless, an improvement in the condition of the labourers was effected, partly by the protests of the Chinese Government, partly by the ruin of the plantations or the exhaustion of the guano-beds, and often by the revolts of the victims. The importation of coolies ceased, and those who remained in Peru, some 50,000, have recovered their liberty. Most of the Chinese have given up their national dress and no longer wear the pig-tail. They are scattered everywhere, and are even met in the settlements on the Amazonian slope.

In the towns they take to trade, keep hotels and restaurants, practise diverse crafts, and succeed in all their undertakings. Hence they excite great jealousy, and at the time of the occupation of Lima by the Chilian forces, nearly 300 Chinese tradesmen were murdered and their shops plundered; a massacre also took place on the plantations of Cañete.

Formerly the natives were often compared with the Chinese, and in the popular language the term *Chinos* is still applied to the uncivilised Indians. It was even pretended that the coolies, on landing at Eten, recognised the descendants of the Yuncas as their kinsmen, both in origin and speech. But whatever be the primitive stock of the Peruvian natives, the recent Chinese immigrants differ altogether from them in their more energetic and resolute character, as well as in their mental capacity.

Numerous Sino-Peruvian families have already been constituted, and thus has begun the gradual ethnical fusion of the races of the Old and New Worlds. Till recently the Peruvian women showed the greatest repugnance to the Chinese, the *Macacos* ("Apes"), or "people of Macao," as they called them; now, on the contrary, they greatly appreciate the gentle character, the sense of justice and the family virtues of these "celestials."

Of the Pacific Islanders scarcely any survive, nearly all having been carried off by consumption; 2,000 Kanakas imported in 1863 from the Marquesas Archipelago had perished almost to a man within eighteen months.

Taken as a whole, the national unity appears to be far less firmly established in Peru than in the other South American republics. Class differences, far more than diversity of origin, separate the urban from the impoverished rural populations as widely as if they were two distinct nations. This lack of cohesion constitutes a great danger, and was one of the factors that in the late conflict assured the triumph of the Chilian forces, animated by a more developed national sentiment.

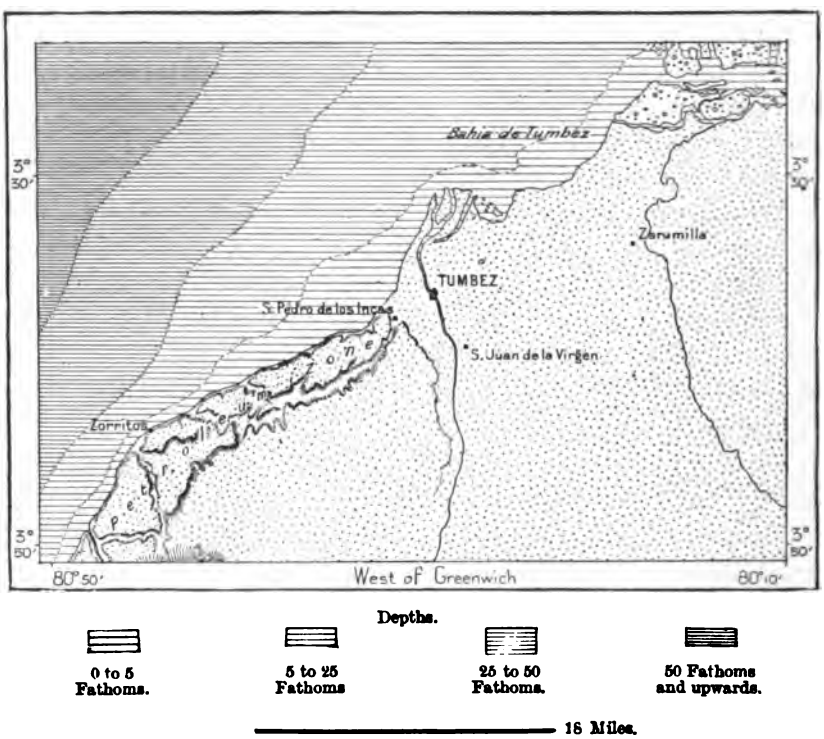
VII.

Topography.

In her northern provinces Peru has no cities to rival the Ecuadorean seaport of Guayaquil in commercial importance. *Tumbez*, sighted by vessels coming from the south, before penetrating into the Jambeli channel, at the entrance of Guayaquil bay, is more interesting for its historic memories than for its exchanges. Here the first Spanish adventurers landed in the year 1528, at which time this city of the Incas possessed a strong fortress, a palace, a wealthy temple,

Fig. 120.—Tumbez and its Deserts.

Scale 1 : 750,000.



and a convent of the "Vestals of the Sun." At present it has little to show except its low houses threatened by the sands; and the Rio Tumbez, descending from the auriferous Zaruma regions, no longer feeds the network of irrigating rills which formerly ramified to a great distance over the surrounding plains. At Tumbez the beach shoals so gradually that the shipping has to ride at anchor a long way off the coast.

West of the Amatope "Pitch Hills" the port of *Talara* has recently been founded by some capitalists interested in the petroleum industry. An underground conduit, 7 miles long, fed by pumping gear capable of raising 1,000 tons of petroleum in a day, conveys the oil from the wells of *Negritos* to the Talara

reservoirs, while another conduit supplies the water required for the works and for the surrounding gardens.

Talara—Eten.

At Talara, which has one of the best anchorages on the Peruvian coast, only the refined oil is shipped, the agricultural produce of the northern district being all forwarded through the ports of Tumbez and *Paita*. Two-thirds of the whole traffic, estimated in favourable years at from £500,000 to £600,000, are centred in Paita, which stands at the head of a deep inlet. Although surrounded by sands, like Tumbez, the harbour of this place is better sheltered from the prevailing southern winds, and it is also deeper, affording from 20 to 24 feet of water within half a mile of the shore.

The copious Rio Achira (Chira), which reaches the bay of Paita some 12 miles farther north, yields an abundance of water, conveyed to the town by an aqueduct. The Rio de Piura, another scarcely less copious stream, describes a great bend, bringing it close to Paita, and ramifying in a thousand channels over the fertile plains of *Piura* (*San Miguel de Piura*). This place claims to produce "the best cotton in the world," which, with the straw hats of the neighbouring *Catacaos*, and fabricated antique potteries, supposed to come from the surrounding burial-places, is shipped by the steamers calling regularly at Paita. A coast railway connects Paita with Piura and Catacaos, and also affords communication by a loop line between the Achira and Piura valleys. In this district are bred the best mules in Peru, and some gold-mines are worked near *Ayavaca*, perched on a lofty mountain (10,200 feet), in the upper Achira basin.

South of the Sechura desert, the most extensive solitude in North Peru, the first seaport lies at the mouth of the Rio Morrope, whose bed is waterless for the most part of the year. Here are situated the two large villages of *Morrope* and *Motupe*, surrounded by sugar-plantations cultivated by Chinese labour. Farther on are the open roadsteads of *Lambayeque*, *San José*, *Pimentel*, and *Puerto de Eten*, all shallow, dangerous, and exposed to the winds and surf. The towns of the plains, standing a few yards above sea-level, are all connected by a network of railways radiating from *Chiclayo*. One branch runs north-east by Lambayeque to *Ferriñafe*; another ascends the slopes eastwards in the direction of *Patapo*, at the entrance to the gorges; a third runs south to *Monsefu* and Puerto de Eten, and a fourth west to Pimentel.

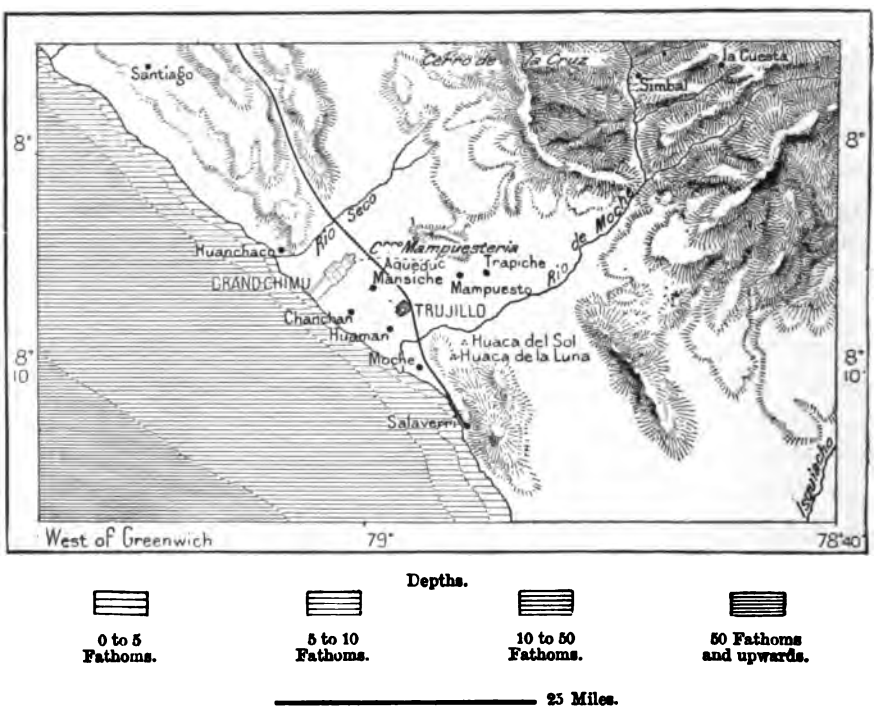
Eten was till recently inhabited by a community of full-blood Indians, speaking a Yunca dialect, supposed by some to be related to Chinese. At present all speak Spanish, and are one of the most industrious peoples in Peru, manufacturing hats, fans, cigar-cases, and many other fancy articles of artistic design. Lambayeque and *Trujillo* contend for the honour of having been the first towns to throw off the Spanish yoke. The *Lobos* Islands, off Lambayeque, have acquired considerable economic importance from their guano-beds, estimated originally at 8,000,000 tons.

Pacasmayo—Trujillo—Chimu.

The port of *Pacasmayo*, south of the Jequetepeque coast stream, presents the same general aspect as Eten; it does a brisk export trade in sugar, hides, and silver ores, and is connected by rail with the inland towns of *San Pedro de Lloc*, *Chepen*, and *Guadalupe*. But far more important for its future prosperity is the projected line to Cajamarca and the Amazons valley, which will probably form part of the trans-continental trunk line between the Atlantic and the Pacific. North-east of San Pedro de Lloc the rails penetrate into the mineral district of the Jequetepeque, which river is followed along all its windings up to its very

Fig. 121.—Trujillo and Grand Chimu.

Scale 1 : 600,000.



source. Farther on the line ascends in zigzags up the slopes to a breach in the cordillera at an altitude of about 9,500 feet, through which it descends to the Amazonian slope, reaching Cajamarca by a great bend round to the north-west. Beyond this point, in the direction of Chachapoyas and Moyobamba, it enters a little-known region, where the surveys are not yet complete.

South-east of Pacasmayo follow the wretched little port of *Garita de Moche* (now *Salaverri*) at the foot of the Cerro Carretas, and the equally exposed road-steads of *Huanchaco* and *Malabrigo* ("Bad Shelter"). The railway, starting from Salaverri, penetrates northwards to the rich plantations of the Rio Moche, Trujillo,

Huanchaco, and the Chicama plains, which last have since 1860 again been brought under cultivation by reopening the old Indian irrigating canals. On these slopes the irrigation works take the collective name of *manpuesteria*, and amongst them was the vast reservoir, built of concrete by the Chimu Indians, with a capacity of about 1,760 million cubic feet.

Trujillo, founded by Francesco Pizarro in 1535, and named from his native place, has preserved a certain urban aspect, thanks to the remains of its old ramparts; but it probably contains less than a tenth part of the inhabitants of its predecessor, *Chimu*, or *Grand Chimu*, capital of an empire anterior to that of the Incas. The ruins of the ancient city and of its dependent villages cover a vast space, stretching north and south of the Rio Moche, a distance of over 12 miles, with a breadth of from 5 to 5½ miles. It appears to have been the largest centre of population of the New World in pre-Columbian times. Everywhere are seen crumbling walls and heaps of adobe, in some places distinct enough to trace the plan of the old buildings. The city proper, standing on three terraces which rose above the shore between Trujillo and Huanchaco, contained temples, palaces, reservoirs, granaries, labyrinths, tombs and aqueducts, which have been clearly determined by archæologists.

Certain sepulchral pyramids, with innumerable niches in which the bodies were deposited in a sitting attitude, are comparable in dimensions to the secondary pyramids of Egypt. One of these *huacas*, the "Pyramid of the Sun," near the village of the same name on the south side of the Rio Moche, is 200 feet high, with a base-line of 800 feet in one direction. According to the local belief it contains vast treasures, and communicates by underground galleries with other structures of a similar character. Another pyramid is 150 feet high, while a third is said to have yielded the treasure-seekers as much as £3,200,000 of gold between the years 1560 and 1592. Since that time fictile vases, textile fabrics and jewellery of all kinds have been found amid the rubbish and in the graves. No other Peruvian necropolis has yielded to collectors such an abundance of statuettes, earthenware, skulls and mummies.

Viru—Yungay—Cabana—Cajatambo.

According to some etymologists the Rio Viru, which waters a narrow strip of cultivable land south of the Rio Moche, is the famous "river of Biru" or "Piru," which for so many years dazzled the dreams of Pizarro, Almagro and their associates, and the name of which under the modified form of Peru has since been applied to one of the large South American States. But, however this be, the present village of *Viru* has little to show except the graves of the surrounding district rifled by treasure-hunters and archæologists. Facing it, however, is the little cluster of the *Guanape Islands*, which till recently possessed rich guano-beds, though of inferior quality to those of the Chincha Islands, being deprived of some of their salts by more frequent rains. When first opened the deposits were estimated at 1,500,000 tons, but in a few years the bare rock had been reached;

in 1874 as many as 372 vessels shipped over 300,000 tons, and in 1883 nothing remained.

South of the Rio Santa the semicircular curves of the shore-line offer better and more sheltered anchorage than farther north. On El Ferrol Bay the new town of *Chimbote* has sprung up, amid the shapeless ruins and graves of an old city of the Yunca Indians. This place was a mere fishing hamlet before the year 1871, when it was chosen as the first station of the Huaraz line, which ascends the Rio Santa valley, and the construction of which rapidly drew a considerable population of Peruvians, Europeans and Chinese to the district. Unlike most of the other coast lines, this railway already penetrates into the heart of the Cordilleras, ascending the long Huaraz (Huaylas) valley to the mining town of Recuay, at the source of the Rio Santa, 11,000 feet above sea-level. The earthenware found in the Chimbote graves resembles the Etruscan potteries, being made of a whitish clay embellished with red and black designs.

Huaraz, capital of the department of Ancachs, also stands at a height of over 10,000 feet, in a cold region, but with an equable climate, where water never freezes. The district abounds in ruins dating from pre-Columbian times. In the walls of the modern cemetery have been built in numerous old sculptured blocks, all brought from a plateau facing Huaraz on the slopes of the Cordillera Negra. Many of these stones represent deformed or grotesque human figures, their heads encircled by a kind of coronet, and rods or sceptres in their hands. Other blocks, found both here and in many other parts of Peru, are hollowed out like cattle-troughs, and were probably graves, being about the normal size of the Quichuas.

Yungay, in the same basin, stands on a torrent over against Huascan, giant of the Peruvian Andes. Almost daily avalanches of snow are seen from the village rushing down the slopes from precipice to precipice, and so rapidly transformed to clouds of dust that the vapours are dispersed and the outlines of the mountain again revealed before the long echoes of the crashing masses reach the ears of the spectators. A short distance below Yungay flows the Ancachs brook from which the department takes its name, in memory of the decisive victory here gained by the republicans over the royalists. Yungay itself was officially named *Ancachs*, but in popular usage retains its old title.

Lower down, the cheerless town of *Caraz* lies in a fertile district where is cultivated the *chaucha* variety of the potato, which matures in three months, that is, in half the time of the ordinary kinds. This tuber grows wild on the surrounding slopes, though not so profusely as in the upper Santa valley. Near Caraz is a quicksilver-mine, which also contains argentiferous lead. But the chief resource of Caraz are its coal-beds, of excellent quality, cropping out on the left bank of the river. Coal also occurs at *Huaylas*, farther down the valley, where the Rio Santa begins to trend north-westwards on its course through the Western Cordillera to the Pacific.

Above the last gorges the Santa is joined by the Manta, or Chuquicara, which traverses a mining district inhabited by an impoverished population living in

wretched hovels. Yet the country was formerly rich, and covered with sumptuous cities, such as *Huandoval* and *Cabana*, whose ruins still present an imposing aspect. The still standing walls are decorated with granite friezes, and were originally covered on the inner side with sculptures in porphyry and other hard stones, most of which have been removed to churches and other modern buildings. Nowhere else have the Quichua artists carved more lifelike figures; they are, in fact, real portraits, stamped with a highly original expression.

Fine earthenware has also been brought to light, attesting a lamentable

Fig. 122.—Caraz and Ancachs Mountains.

Scale 1 : 700,000.

debasement of art since the old times. The same decay is seen in the now arid terraces, over 10,000 feet high, which were cultivated by the ancestors of the present Peruvians. Farther east the black ramparts of a ruined fortress rise above the snowy wastes on the Huaullang plateau, leading to the upper Marañon valley.* In this now desolate region the largest place is *Santiago de Chuco*, on a headstream of the Chuquicara.

South of Chimbote the coast streams, such as the Rio de Casma, the Rio de Huarmey, and the Barranca, continue to flow through alternating sandy wastes and green oases, watered by irrigating rills derived from the rivers. *Cajatambo*,

* Ch. Wiener.

chief place in the upper Barranca basin, possesses rich silver-mines. But formerly the population appears to have been concentrated more on the coastlands, where are still seen the extensive ruins of *Pativilca*, and the superb "fortress" of *Paramanca*. The surrounding plain, flooded during the sudden freshets of the Barranca, is one vast necropolis, the *panteon de los gentiles*, in which are found thousands of skeletons sewn up in sacks.

Supe—Ancon.

Supe (*Huaura*), at the mouth of the Rio Supe, and *Huacho*, six miles farther on, have acquired considerable importance since the opening of the railway connecting them with Lima. From Huacho the capital draws much of its fruits, vegetables and other supplies, besides salt from the large salines on the neighbouring coast. In the district numerous Peruvian graves have been opened; but the most interesting remains have been found near Chancay, midway between Huacho and Lima; here are also seen large underground chambers, which, according to the local tradition, were used as granaries.

While the railway works were in progress a cutting in the dunes at *Ancon*, south of Chancay, exposed a vast necropolis, containing well-preserved mummies, several often wrapped in a single pack, besides textiles, utensils and an endless variety of other objects, throwing a flood of light on the social life, arts and industries of these populations.* Several of the graves have the form of the *rancho* or *casa*, their roofs resting on four stakes or on four walls, and apparently thatched originally with reeds. This mode of burial was, no doubt, reserved for the wealthy classes, whose equipment also was far more sumptuous than that of the common people. Some of the outer wraps enclosing the mummies of perhaps a whole family were extremely rich, and usually arranged so as to represent a single human effigy, with a false head, and very broad, but showing no extremities or other outlines of the figure.

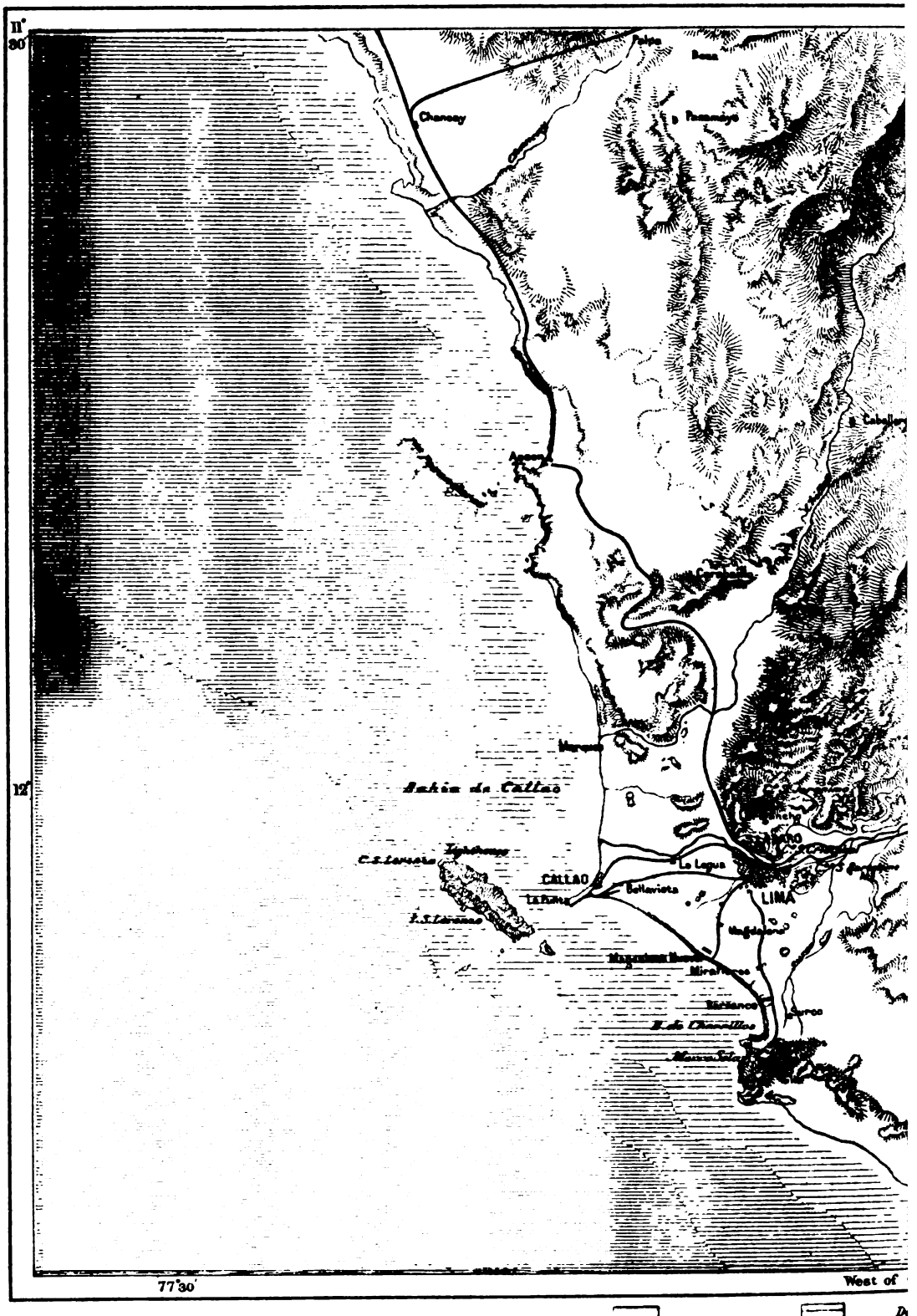
Lima.

Unlike most Peruvian cities, *Lima* dates only from post-Columbian times, having been founded by Francesco Pizarro in 1535. After choosing as his residence first Cuzco, capital of the Incas, and then the more central Jauja, the Conqueror finally decided on a site close to the sea, in order to maintain easy communications with Europe. His choice fell on the banks of the Rimac, thanks to the proximity of the roadstead sheltered by the island of San Lorenzo. From the first the city was laid out on a vast plan, with large squares and broad thoroughfares. In fact, like Washington, it began by being a city of "magnificent distances," in anticipation of its destinies as metropolis of a mighty empire. The municipal arms of the *Ciudad de los Reyes*, "City of Kings," as it

* W. Reiss and A. Stübel, *Peruvian Antiquities, the Necropolis of Ancon, in Peru*. English Edition, by A. H. Keane.

GENERAL VIEW OF LIMA, TAKEN FROM THE SOUTH.

LIMA FROM CHANC



CHANCAY TO PACHACAMAC.

Appleton & Co

was first called, bear the symbolic star which guided the royal Magi to the cradle of a God.

But all Pizarro's hopes have not been realised. Rimac, softened to Lima in the mouth of the Spanish settlers, has not maintained the position assigned to it by the Conquerors, a position of which it made little use except to oppress the native populations in the name of the King of Spain and of the Holy Inquisition. Like Seville and Valladolid, Lima had its auto-da-fés, and its prisons were ever crowded with real or suspected rebels and heretics sent from all the Pacific coastlands between Panama and the island of Chiloé. So far from being the "Empire City" of the New World, it has been outstripped by several places even in the Southern Continent.

Its position at the outlet of a valley, affording free play to the cool breezes of the snowy mountain, gives it a lower and pleasanter temperature than that of the neighbouring towns, the mean range of the thermometer being, according to Tschudi, little more than 8° Fahr. But although equable, the climate is far from healthy, the foggy winter season bringing fevers and dysentery, which in some years assumes an epidemic character. The mortality constantly exceeds the birth-rate, and the population has also suffered much from wars and political disorders. Moreover, for many years Lima was little more than the nominal centre of the Peruvian republic. The lack of easy communications severed its relations with the remoter provinces, so that Cuzco, Arequipa and other centres of attraction were able to challenge its political preponderance.

Although little over three miles in a straight line from the coast, Lima stands, not on the lowlands, but on a triangular plateau skirting the left bank of the Rimac, at a height of 575 feet above sea-level. Around the central quarter as planned by Pizarro have been developed some less geometrical quarters, while on the opposite side of the river, here spanned by two bridges, the new town of *San Lazaro* has sprung up at the foot of the San Cristobal eminence (1,415 feet), which is crowned by a fortress. The houses, usually of two stories, are built of adobe, and are disposed in a square round a central patio in the Moorish style adopted by the Spaniards.

The chief edifice is the cathedral, which was begun by Pizarro and finished in ninety years. Few religious edifices contain such a wealth of gold and gems; the very pillars are of massive silver, and several other churches show an almost equally lavish display of the precious metals and marbles. But, on the other hand, the monastery of San Francisco, formerly the richest in the city, is falling to ruins, while the palace of the Inquisition is now the Senate House. Statues and fountains adorn the squares and avenues; but the only local industries are those concerned with the production of objects of primary necessity. Nothing is manufactured for the export trade, and the commerce of the place is almost entirely in the hands of foreign merchants.

Amongst the learned institutions are the University of San Marcos, the oldest in South America, dating from the middle of the sixteenth century; the library, enriched by treasures transferred from the convents or bequeathed by private

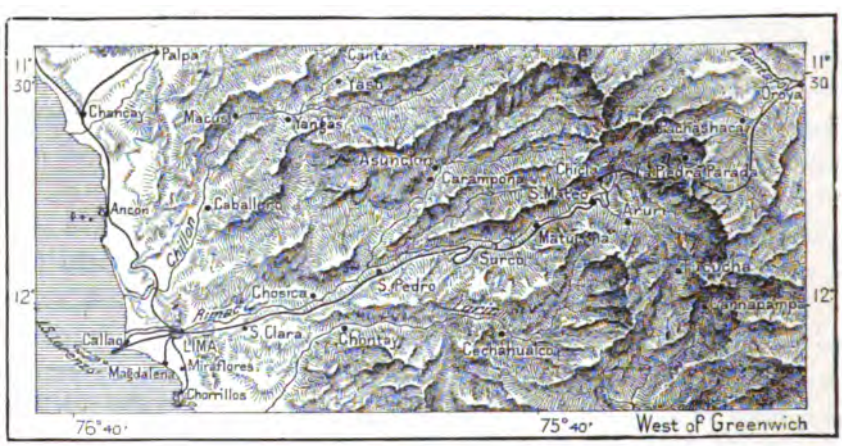
munificence; the museum, comprising objects of art, archæology, ethnology and natural history. But both library and museum have suffered from the visit of the Chilians, who carried off some of their most valuable contents.

Callao—Pachacamac—Ica.

Callao, port of Lima, from which it is distant scarcely seven miles, is connected with the metropolis by an avenue of trees and by two railways, one direct, the other winding over the plain. The bed of the Rimac reaching the coast two miles farther north is usually waterless, and Callao, which retains its old Quichua name in a slightly modified form, derives nothing from the irrigation canals except what is absolutely needed for alimentary purposes. It has been twice rebuilt since 1535, after its destruction by earthquakes in 1630 and 1746.

Fig. 123.—Oroya Railway.

Scale 1 : 1,800,000.



The fortress at the western extremity was the last point on the American seaboard held by the Spaniards, who did not abandon the place till 1826. They even attempted again to capture it in 1866, but their fleet was repulsed, an event commemorated by a bronze group erected on the public square. Later the Chilians were more successful, having captured both port and citadel.

In Callao is centred over half of the whole trade of Peru. Its roadstead is sheltered by a sandy spit from the south wind, and by the islands of San Lorenzo and Fronton from the south-west gales. The shipping rides at anchor close to the shore, or in a new harbour over 50 acres in extent; lines of railway are carried over piers into deep water, and amongst other harbour works is a repairing dock over 300 feet long.

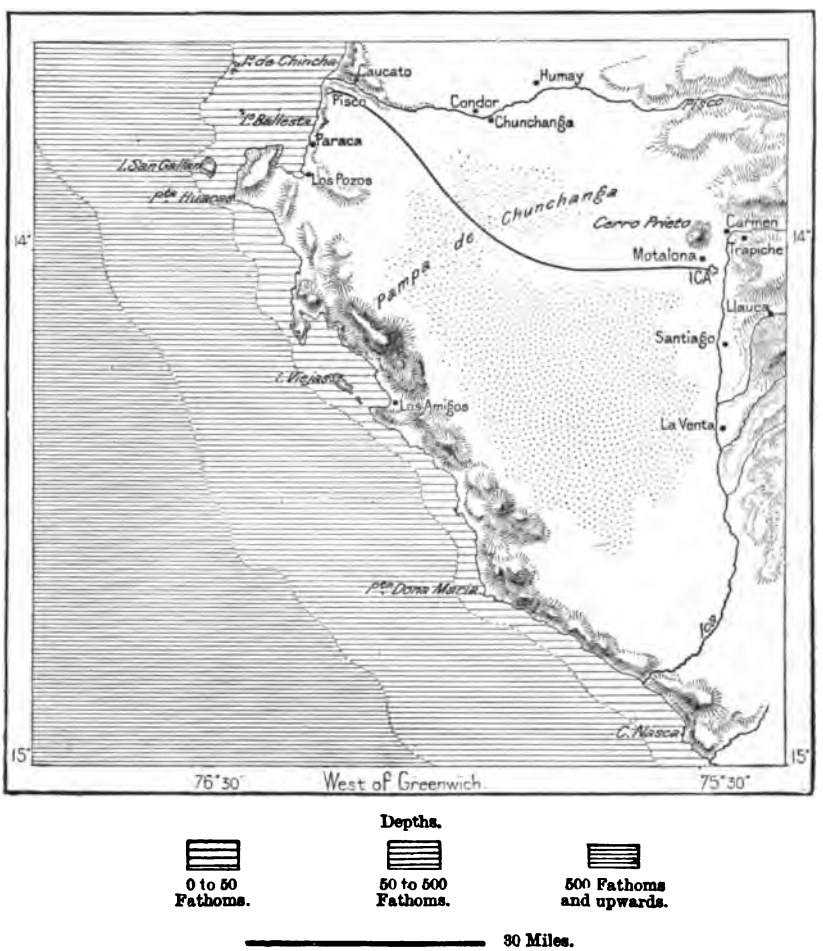
Callao imports textiles and other European wares, coal, wheat and maize for the natives, and rice for the Chinese; the chief exports are guano, nitrates and

the precious metals. In this foreign trade British shipping takes the first and that of Chili the second place, France, Germany, and the United States following at a long distance in the order named. Numerous war-vessels also visit Callao, which is one of the chief stations for the Pacific squadrons.

Lima is connected by rail with several watering-places and pleasure resorts, such as *Ancon* in the north, and *Magdalena*, *Miraflores*, and *Chorrillos* in the south,

Fig. 124.—Pisco and Ica.

Scale 1 : 1,600,000.



the last mentioned near the fertile and well-peopled valley of *Lurin*. To this district archæologists are attracted by the ruined temples and palaces of the ancient city of *Pachacamac*, so named in honour of the "Creator of the World," God of the Yunca Indians.

Some old buildings, most of which appear to date from pre-Inca times, crown the rocky summits extending along the coast south-eastwards from the Chorrillos eminence. The great temple, probably dedicated to the Sun, stood on a crag

560 feet high, called by the natives Mama-cuna. This eminence has been cut into step terraces forming a pedestal to the whole group of buildings, the cliffs facing seawards being painted red. Here Squier discovered a true arch, a feature elsewhere unknown in native American architecture.

The other palaces can no longer be recognised, Pachacamac having been first plundered by Pizarro's followers, and then for 350 years exposed to the pickaxe of treasure-seekers. According to a local legend, the Incas of Cuzco had a palace at Pachacamac, and on the neighbouring beach were captured the fish destined for the emperor's table.

Since the opening of the Andes line Lima has obtained access to several inland health resorts, such as *Surco, Matucana, San Mateo* and *Chicla*, stations presenting a succession of superimposed climates ascending from above the dusty plains to the highest zones of rains and snows.

South of Lurin and *Chilca* the seaboard assumes the aspect of a vast desert interrupted at intervals by narrow oases, one of which, *Cañete*, comprises some of the richest plantations in Peru. Farther on, the shore-line curves round to the south as far as the rocky headland of Paracas, which projects northwards and is continued in the same direction by the Chincha Islands. Thus is inclosed a somewhat sheltered basin, near which has sprung up the seaport of *Pisco*.

This place is connected by a railway, 45 miles long, with *Ica*, which lies on the Rio Ica at the point where it emerges from the mountain gorges, and ramifies in countless channels through the orchards, vineyards and palm-groves of the surrounding plains. The famous wines of Ica, although resembling Madeira, and containing a large proportion of alcohol, are not exported to Europe, but largely used in the preparation of highly appreciated liqueurs. From the name of the seaport whence they are forwarded to various parts of South America, the term "pisco" is now commonly applied to all brandies, and even to the spirits extracted from sugar-cane.

The Rio Chunchanga (Pisco), whose bed is mostly dry, and which reaches the coast just north of Pisco, descends from a region of the cordillera exceptionally rich in argentiferous veins. The town standing at its source has taken the name of *Castrovireina*, in memory of the viceroy Castro's wife, to whom the owner of the mines presented the silver pavement of the path which she had to follow in order to attend the christening of his son. But most of the mines are now abandoned, the richest having given way and crushed to death over 120 of the hands engaged on the works.

The Chincha Islands.

The Chincha Islands fringing the coast at Pisco were till lately the centre of an active trade. In his *Historia del Nuevo Mundo* the Jesuit missionary, Bernabé Cobo, states that in stormy weather the air was darkened by the yellow dust of the guano from these islands, which dust, falling on the surrounding plains, burnt the vegetation and sterilised the ground. But the ancient Quichuas were well

GUANO BEDS, CHINCHA ISLANDS—VIEW TAKEN IN 1875.

aware that this *huanu* (guano), applied in moderation, stimulated the growth of plants and improved the crops. In some of the old quarries their implements, especially a kind of three-pronged fork in hard wood, have been found associated

Fig. 125.—The Chincha Islands in 1856.

Scale 1 : 45,000.

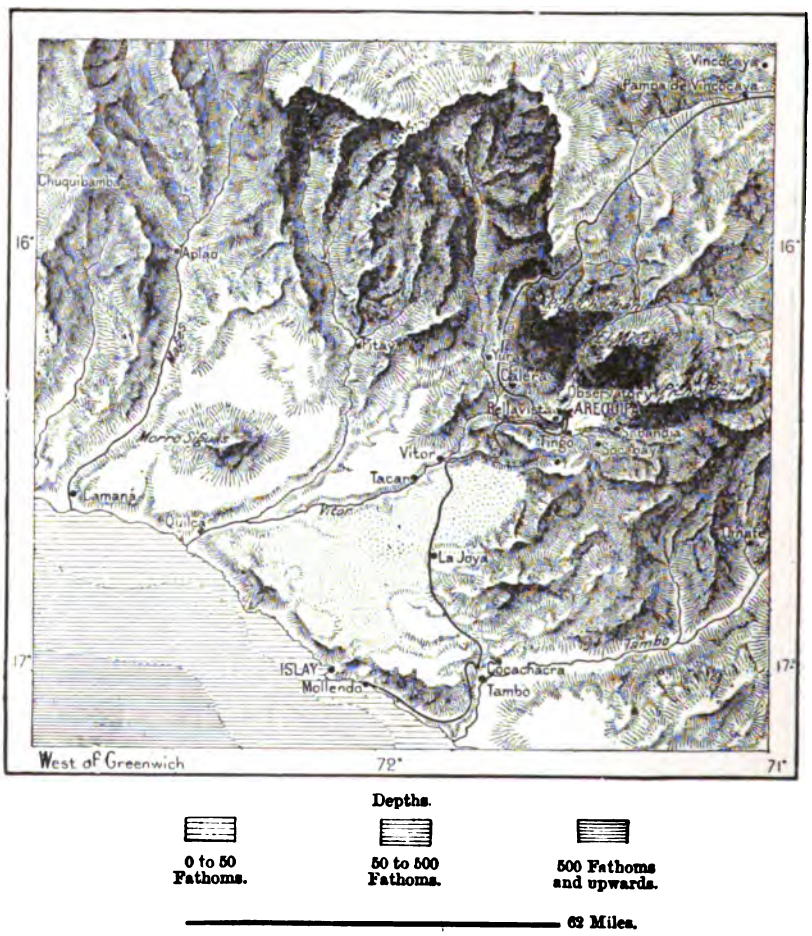
with gems and other valuable objects. The penalty of death was passed on those killing the *guanero* birds, and no one was allowed to approach the islands during the season of incubation.

In modern times the export of guano in a large way began in 1841, and three

years later Rivero estimated at 36,000,000 tons the accumulated contents of the beds; those covering the three Chincha Islands to a thickness of from 60 to 100 feet alone represented some 23,000,000 or 24,000,000 tons. It was expected that such treasures would last over a century. But the deposits, of a yellowish-grey above, of a blackish-red below, rapidly disappeared under the pick and shovel of the thousands of hands, nearly all Chinese, South-Sea Islanders or convicts,

Fig. 126.—Arequipa Gradient.

Scale 1 : 2,000,000.



employed on the works. The wretched coolies perished in multitudes, having little food except the birds which they captured at night by holding out lanterns at the entrance of their roosting-places.

The Peruvian Government, owner of the *guaneras*, and the speculators of all nations who acted as its intermediaries with the European buyers, saw in this industry nothing but present profits from a turn-over exceeding £4,000,000 yearly. Sale prices rising to thirty times the cost of production left the directors

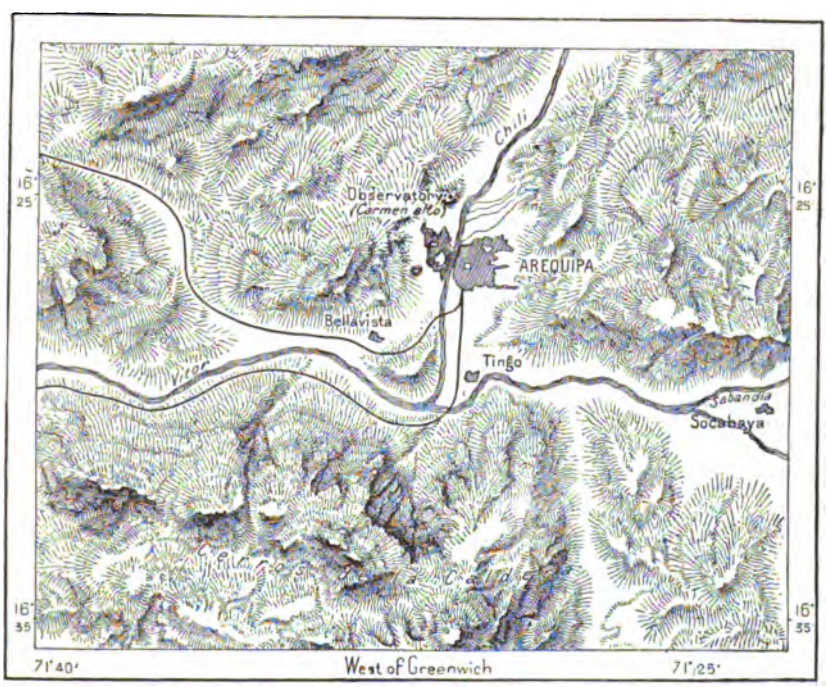
ample scope for "rigging the market," for distributing favours and sinecures, for peculation and frauds of all kinds. Like the legacy of the old gold-mines, the guano-beds proved a baneful "windfall" for Peru, and the demoralisation caused by it may have largely contributed to the humiliating defeat of the nation in the war with Chili. Not a shovelful now remains, and henceforth Peru will have to depend on the honest labour of her citizens.

Arequipa—Carmen Alto.

Some 60 miles south-east of the Chinchas follow *San Nicolas* and *San Juan*, two of the best havens on the Peruvian seaboard. But harbours can be of little

Fig. 127.—Arequipa.

Scale 1 : 330,000.



use on a desert coast, where the Tanga wastes offer nothing but bare rocks for a space of over 400 square miles. Farther on follow *Camana*, *Quilca*, *Islay* and *Mollendo*, which were, or still are, maritime outlets of the important city of *Arequipa*. Mollendo has been chosen as the seaward terminus of the trunk line which already connects South Peru and Bolivia with the coast. It is supplied with water by a conduit 116 miles long, which descends from the Arequipa valley over hills and precipices down to the sea. Next to that conveying water from Pica to Iquique, it is the most remarkable work of the kind on the seaboard.

The railway climbs the slopes in zigzags, a distance of 100 miles, to Arequipa at an altitude of 7,650 feet, the mean incline scarcely exceeding half an inch in the yard. After turning the Caldera hills on the west it curves round east, and continues the ascent along the Rio Vitor. The city stands in the centre of a fertile plain 12 miles in circumference, covered with maize and lucerne fields, and dominated by the superb cone of Misti.

Villa Hermosa, the Spanish settlement founded by Francisco Pizarro in 1540, near the Indian town of Arequipa, claims to be the first city in Peru, not for extent or population, but for its industrial spirit, the literary and artistic taste of the inhabitants, the charm and intelligence of the women. But it is exposed to frequent earthquakes, by one of which it was nearly destroyed in 1868; it has also suffered much from sieges and revolutions, being the great southern rival of the northern metropolis.

Numerous villages scattered over the environments serve as rural retreats for the wealthy citizens of Arequipa during the so-called "winter" season, from December to May, when the arid plains are refreshed by light showers. Such are *Bellavista* in the south-west, and *Tingo* in the south, both connected with the city by fine avenues; *Sabandia* in the east; *Tiabaya* and *Uchumayo* at the head of the Mollendo aqueduct in the west. The neighbouring eminence of Carmen Alto, on the right bank of the sparkling Rio Chili, is now crowned with an observatory, 8,050 feet high, due to the efforts of Pickering of Harvard University. Thanks to the rarity of the air observers are enabled to pursue their researches with little interruption throughout the whole year. They have already made some remarkable studies of the planet Mars, and when all the apparatus is set up Carmen Alto will be the most important observatory in the southern hemisphere. On the summit of Chachani a meteorological station has also been established, at an altitude of 16,280 feet, 2,140 feet higher than that of Pike's Peak, hitherto the most elevated on the globe.

Calera—Moquegua.

Beyond Arequipa the railway continues to ascend the slopes, crossing the Chili gorges below the magnificent bridge, regarded as a marvel of art by the Arequipeños, then mounting to a lateral valley of the Rio Vitor at *Calera*, and farther on to the thermal waters of *Yura* (9,430 feet). After sweeping in a great curve round Mount Chachani it enters the upper Sumbay (Chili) valley, whence it reaches the culminating point at *Crucero Alto* (14,640 feet), where many of the passengers are often taken with mountain-sickness. Here begins the descent towards Lake Titicaca, a closed basin which may be regarded as belonging geologically to the Amazonian slope.

In the desolate southern province of Moquegua the only seaport is *Ilo*, at the mouth of the Ilo gorge, where Coles Point affords a little shelter from the south wind. *Moquegua*, capital of the province, stands near the source of the same torrent, 4,490 feet above the sea. Like Ica it is surrounded by vineyards, and occupies an oasis noted for the excellence of its produce.

Colpa—Cajamarca—Hualgayoc.

In the upper Marañon valley, which is disposed parallel with the coast of North Peru, the thinly scattered populations have been unable to found any important towns, although it is evident from the numerous ruins that this region was far more densely peopled under the Incas than at present. Here are seen the remains of large cities, such as *Colpa* (*Huanuco Viejo*) on a western headstream of the Marañon, said to have been "three leagues" in circumference. *Castillo*, as the chief ruin is called, is a vast structure of shingle embedded in clay, decorated on its outer face with animal figures. This "castle," the palaces, temples and baths of this ancient city date probably from a civilisation anterior to that of the Incas.

Chavin de Huantar, on another affluent of the Marañon, was also a great city, above which rises a two-storied stronghold which is reported to contain a labyrinth of underground galleries. Here is a carved block representing a human monster, whose hair is represented by coiling snakes, and who grasps snakes in both hands, either the "Genius of Evil," or, more probably, the "God of Thunder." Here is also a superb bridge of Roman solidity still in use, formed of three slabs 20 feet long resting on strong stone abutments.

The old road of the Incas may still be clearly traced for a great part of its course, running north-eastwards in the direction of *Pomabamba* and *Huamachuco*, the latter a modern place dominated by an old Inca castle. These remote districts have made no progress since the days of the Inquisition; so recently as 1889 a witch was burnt alive in the public square of Huamachuco.

Cajamarca, metropolis of the Central Quichuas, and chief stage of the couriers between Cuzco and Quito, lies in the Sierra at an altitude of 9,385 feet. Towards the south-east is seen the breach through which will pass the railway, now in progress, which is to connect Cajamarca with the port of Pacasmayo on the Pacific. In the district are some ruins dating from Inca times, including the remains of Atahuallpa's palace, the block on which he is supposed to have been sacrificed, and the chamber where was to be deposited his ransom, estimated at £800,000. About three miles from the town are some sulphurous thermal waters at a temperature of 129° Fahr., where the Emperor was keeping his fast, surrounded by 30,000 men, when Pizarro, at the head of his small band, penetrated into the neighbouring city. The spring, which is supposed to rise from the infernal regions, is visited in procession on the great feasts and purified with holy water. *Cajamarquilla* ("Little Cajamarca"), on the opposite side of the Marañon, was also an Inca city, and later a centre of the Indian missions.

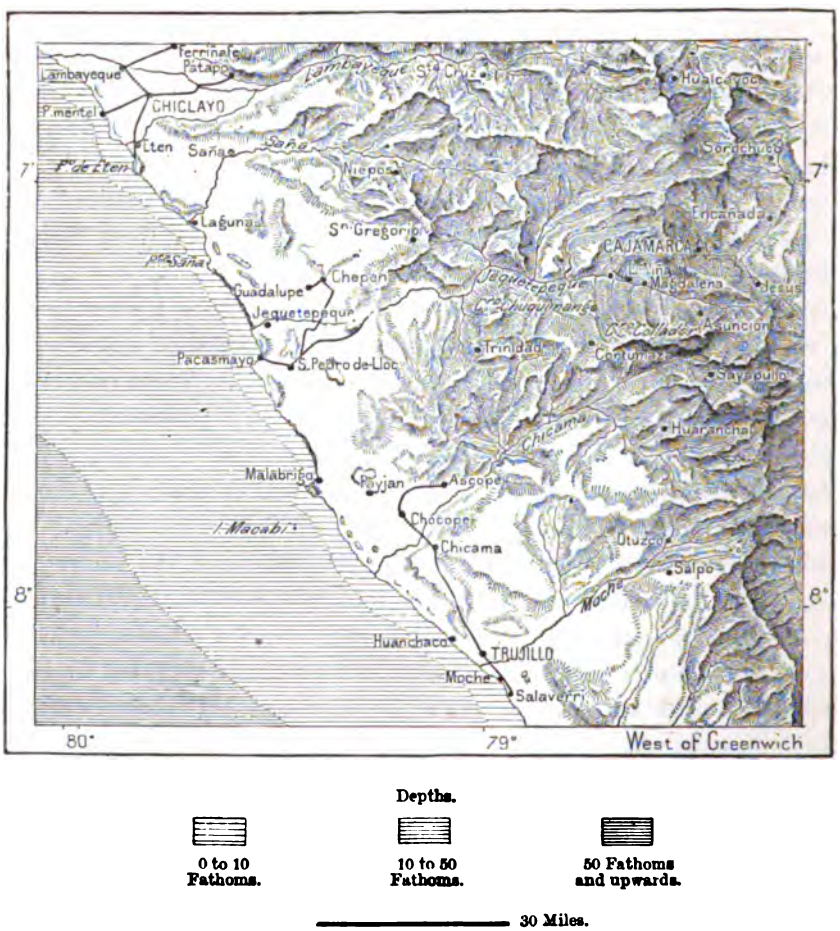
The district where the invaders found so much booty is one of the chief mining regions of Spanish America. The rugged escarpments encircling *Hualgayoc* (11,880 feet) are pierced with hundreds of shafts, from which silver ores have been and still are extracted. Next to Cerro de Pasco, Hualgayoc is the chief silver-mining centre in Peru; but this place has lost much of its importance from the lack of easy communications, the rigorous climate and the depreciation

of silver in the markets of the world. The gold-washings, also, which were formerly extensively worked in North Peru, have been mostly abandoned, though a few Indians and half-breeds still occupy themselves in sifting the sands of various affluents of the Marañon. *Jaen de Bracamoros*, so named from an extinct Indian tribe, was the capital of these auriferous districts.

East of the Marañon, *Chachapoyas*, on the *Utcubamba*, one of the chief tributaries of the upper Marañon, occupies the centre of a thinly-peopled agricultural

Fig. 128.—From Pacasmayo to Cajamarca.

Scale 1 : 2,000,000.



Depths.

0 to 10 Fathoms. | 10 to 50 Fathoms. | 50 Fathoms and upwards.

30 Miles.

region, which might become one of the most flourishing in the New World. The town stands at an altitude of 7,530 feet in the midst of extremely fertile lands, and enjoys an excellent climate intermediate between the cold and temperate zones. These solitudes must have formerly been thickly peopled, as is evident from the remains of a vast necropolis near the village of *Cuelap*, with enclosing walls about 330 feet high, pierced with innumerable niches.

Huanuco—Cerro de Pasco.

Huanuco, the health resort of Cerro de Pasco, near the source of the Huallaga (6,140 feet), is a mining town which has been enriched more by its coffee and

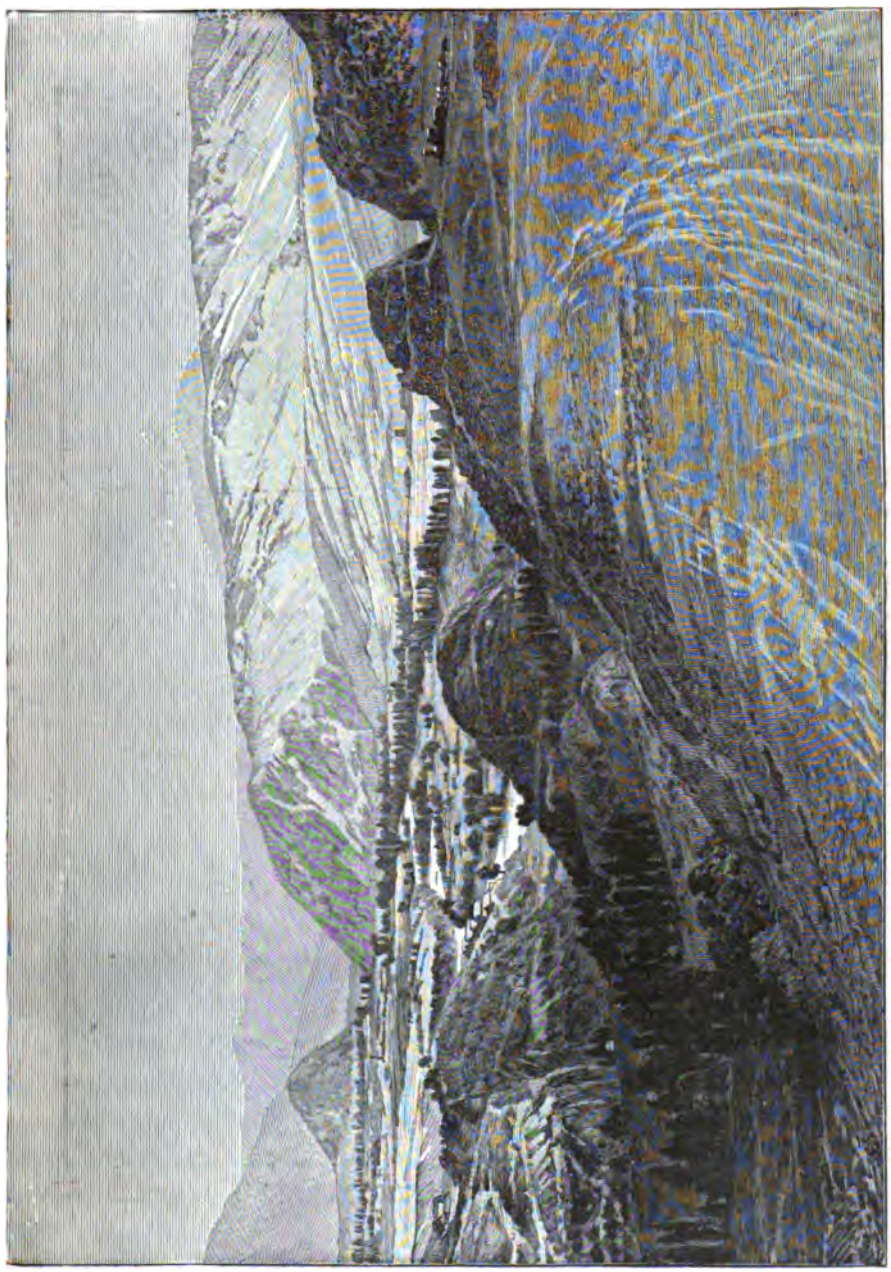


Fig. 123.—Cerro de Pasco.

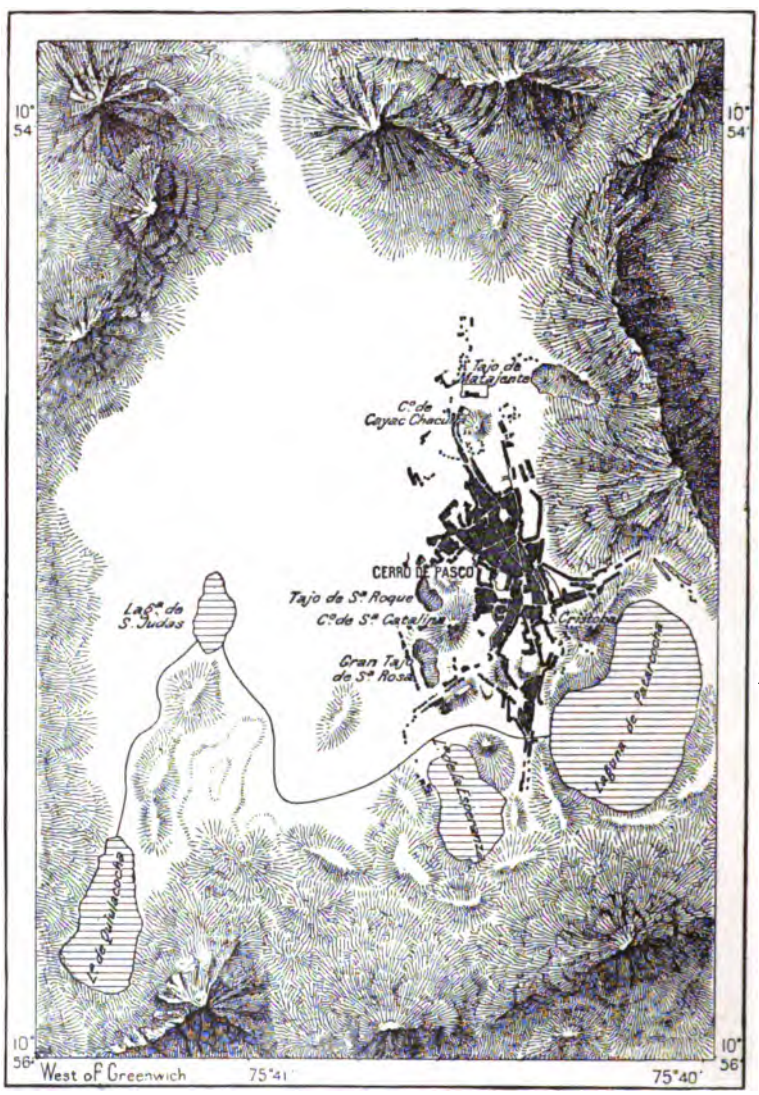
sugar plantations than by its goldfields. In Inca times it was the chief strategic centre between Cuzco and Quito. On the Mayo affluent of the Huallaga stand the

towns of *Moyobamba* and *Lamas*, the latter near *Tarapoto*, where is grown the best tobacco in Peru.

In colonial times *Jeberos*, on the Aipena, which communicates both with the Marañon and the Huallaga, was the largest place in the Upper Amazons basin,

Fig. 130.—Cerro de Pasco.

Scale 1 : 80,000.



§ Mile.

with an estimated population of 15,000, now reduced to about 1,500. Later it was eclipsed by the village of *Laguna*, which in 1830 contained as many as 6,000 Indians. At present it is rivalled by *Yurimaguas*, at the head of the navigation for steamers ascending the Huallaga.

Cerro de Pasco (14,280 feet) occupies one of the highest points of the irregular mass where have their rise the Marañon and the Huallaga in the north, and in the south the streams flowing through the Apurimac to the Ucayali. But for some powerful attraction a place situated in an extremely rugged district, at an altitude high above arborescent vegetation, and, despite its proximity to the equator, in an excessively rigorous climate, could never have invited any settlers beyond perhaps a few solitary pastors. But in 1630 one of these rare visitors found some silver ingots in his hearth, and there was a sudden rush to the spot. The town sprang up as by enchantment, though its population has ever been of a fluctuating character, increasing or falling off according to the output of the mines or the market price of the precious metal.

The silver lode discovered by the shepherd Huari Capcha, who was rewarded by his master with perpetual imprisonment, is still well known and even worked. But besides the Descubridora, as it is called, there are over 2,000 other veins crossing each other in various directions above the town, and forming a vast network connected with two main lodes. Hundreds of galleries have been filled up by the debris, while others, still open but abandoned, develop a vast labyrinth where the explorers at times get lost. In the *Matagente* mine as many as 300 Indians were on one occasion buried alive.

In the course of 250 years the Pasco mines, the most productive in Peru, have yielded a quantity of silver valued at nearly £80,000,000, and the yearly output, although much diminished, still averages £400,000. The yield might be vastly increased were the mines properly drained by tunnelling under all the galleries and carrying off the water to the Lake of Junin. The Pasco uplands also contain gold and copper, as well as coal-beds.

Oroya—Tarma.

Formerly the communications were extremely difficult, and the most frequented route crossed the cordillera by the Lachagual Pass at an altitude of 15,620 feet, nearly the height of Mont Blanc. At present the place is reached by the Lima-Oroya railway, which follows a still more elevated pass. The section between Oroya and Cerro de Pasco is not yet finished (1894), but here the incline is gradual across the plateau.

Oroya ("Liana Bridge") takes its name from a frail suspension-bridge of trailing plants 130 feet long swung across the Rio Jauja at this point, 12,178 feet above sea-level. Since the completion of the railway it has become a health resort for the capital, and an important Government station, with engineering and artillery schools, besides other large public establishments. Oroya is destined to become the central station of the Andes railway system, forming the junction of two lines, one running south-east through the Jauja or Mantaro valley, the other by *Cacas* and the plain of *Junin* northwards to Cerro de Pasco and the Amazonian slope. It was on the plain of Junin that Bolivar gained the famous battle which put an end to Spanish rule in Peruvian territory in 1824.

The Central Peruvian Railway, at present terminating at Oroya, is one of the most remarkable structures of the kind in the whole world. Starting from Callao at sea-level, it rises 500, 1,300, 2,800 and 6,000 feet at the respective distances of 7, 18, 33 and 50 miles; the ascent continues steady and rapid to the culminating point, 15,665 feet, at the 106th mile, beyond which it descends at the rate of 120 feet per mile along the last section of 30 miles to Oroya, a total distance of 136 miles from the coast. The British Consul at Callao, who supplies these details, adds that Oroya is likely to become a place of great commercial importance, and is already the centre of an active mining industry, smelting-works having been established at convenient points near the terminus, where ores from the neighbouring districts are reduced to a form suitable for conveyance to the coast for exportation.

The Oroya line is to be continued eastwards in the direction of *Tarma* and *Chanchamayo*, and thence to the head of the navigation of the Marañon. It is expected that Peru will enter on a career of great prosperity on the completion of this section, which will afford rapid and easy communication from the Pacific through the Amazonian regions to the Atlantic Ocean. Tarma, which is separated from Oroya by one of the inter-Andean chains, stands at an altitude of 10,000 feet, on a verdant plain where formerly stood the Peruvian city of *Tarmatambo*. The ruins of this place, with its "palace of the Incas," stand on a terrace still dominated by crumbling fortifications.

Farther east the Chanchamayo valley has already attracted several groups of settlers, who supply the inhabitants of the plateau with most of their coffee, sugar and rum. French and German colonists own most of the plantations between Tarma and the fortified station of *San Ramon*, which stands, at a height of 2,590 feet, at the confluence of the Chanchamayo and the Tulumayo, forming the Oczabamba, main branch of the Rio Perene. Beyond this district the most-frequented route at present runs through the Amazonian forests to *Puerto Tucker*, on the navigable Rio Pichis, leading to the Rio Pachitea and the lower Ucayali.

Jauja—Huancavelica.

Following the course of the Jauja below Oroya, the traveller reaches the town of *Jauja* (11,160 feet), which gives its name to the river, and which at the time of the Conquest was described as "a very large city, built like those of Spain, where over 100,000 people daily gathered on the public square." Lower down near the Huancayo route stands the convent of *Ocopa*, mother-house of the Barefoot Friars, who founded numerous stations in the forests traversed by the Ucayali and its affluents.

Huancayo also lies in the valley of the Jauja, which in this section of its course takes the name of Mantaro, and which continues to descend through deep gorges south-eastwards in the direction of Lake Titicaca. But at the confluence of the Huerpa (Ayacucho), whose valley was formerly flooded by the waters of the lake, the Mantaro escapes through a breach in the mountains round to the north-east

and north. Here it rushes down a series of wild gorges through a desolate region visited only by a few Campa savages. The towns in the tributary valley, *Huancavelica, Huanta* and *Ayacucho,* all stand above the gorges beyond the limits of Peru proper. Between Ayacucho and Huancavelica the plateau of greyish rocks has been weathered into thousands of monoliths affecting the form of obelisks, some as high as 150 or 160 feet, and all disposed like the colossal tombstones of a vast graveyard. Some of the sandstone blocks have been hollowed out to serve as dwellings.

In the district of Huancavelica (Huancavilca) a Portuguese miner discovered some quicksilver-beds in 1567, and five years later the town was founded under the Spanish name of *Villarica de Oropesa,* which, however, yielded to that of Huancavelica, perpetuating the memory of the former Huanca Indians. The new settlement increased rapidly, and for two centuries it held a foremost position amongst the cities of Peru. Its mines yielded nearly all the quicksilver used in the New World in the preparation of gold and silver amalgams. But after yielding nearly £20,000,000 of metal the mines became impoverished, and at present the annual output averages no more than about 50 tons. Copious thermal springs with petrifying properties occur near the town. Huanta also, which was formerly rich in silver ores, has lost nearly all its mining resources.

Ayacucho—Sicuani.

Ayacucho, "Gorge of the Dead," formerly *Huamanga,* "Falcon Rock," owes much of its importance to its rank as administrative centre of the department, and as the chief stage on the highway between Lima and Cuzco. Several decisive battles were fought round about this strategic position; in the south the village of *Chupas* recalls the defeat of Almagro the younger in 1542, and in the north *Quinua* should have given its name to the so-called battle of Ayacucho, gained by the republicans over the Spanish troops in 1824. The college of Ayacucho ranks as a university.

Below its confluence with the Mantaro the Apurimac basin has scarcely any centres of population except *Cangallo* on the Calcamayo affluent, and *Abancay* on the mainstream, near the point where the Lima-Cuzco route crosses the river by the highest rope-bridge in Peru.

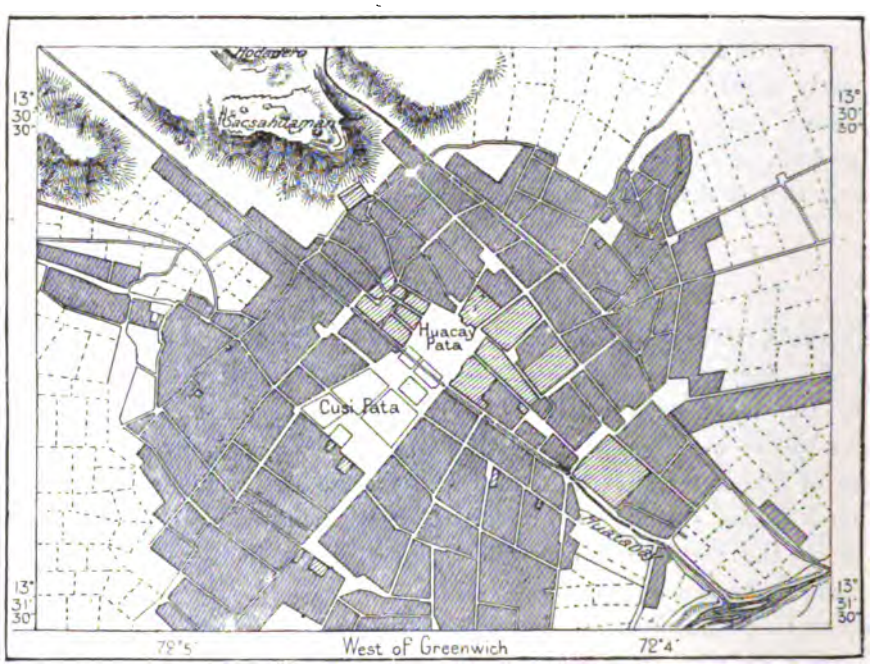
Sicuani, present terminus of the Arequipa railway (11,590 feet), occupies a delightful position on the banks of the upper Huilcamayo (Vilcanota), which here flows at a moderate incline through one of the "paradises of Peru." Near *Urcos,* lower down, is shown the lagoon where, according to a local legend, was formerly suspended the gold chain enclosing the great square of *Cuzco.* But the city itself—usually written with the article, "El Cuzco," that is, "The Naval"—was built, not on the river, but on a *bolson,* a long narrow plain covered with barley and lucerne fields, and dominated north-westwards by a rocky eminence crowned with ruins. It stands at a height of 11,385 feet, in a climate cold enough for snow to fall occasionally on the city.

Cuzco.

This old religious metropolis, "City of the Sun," has overgrown its ancient limits, which were indicated on the right and left by two torrents descending south-eastwards in the direction of the Vilcanota. The towers of the Inca enclosures have disappeared, and new quarters have sprung up beyond the two watercourses. In Inca times Cuzco comprised four distinct quarters, named from the four points of the compass, and in each, separate dwellings were set apart for the Indians according to their northern, southern, eastern or western origin. In the interior of the city the foundations of the houses present solid and broad

Fig. 131.—Cuzco.

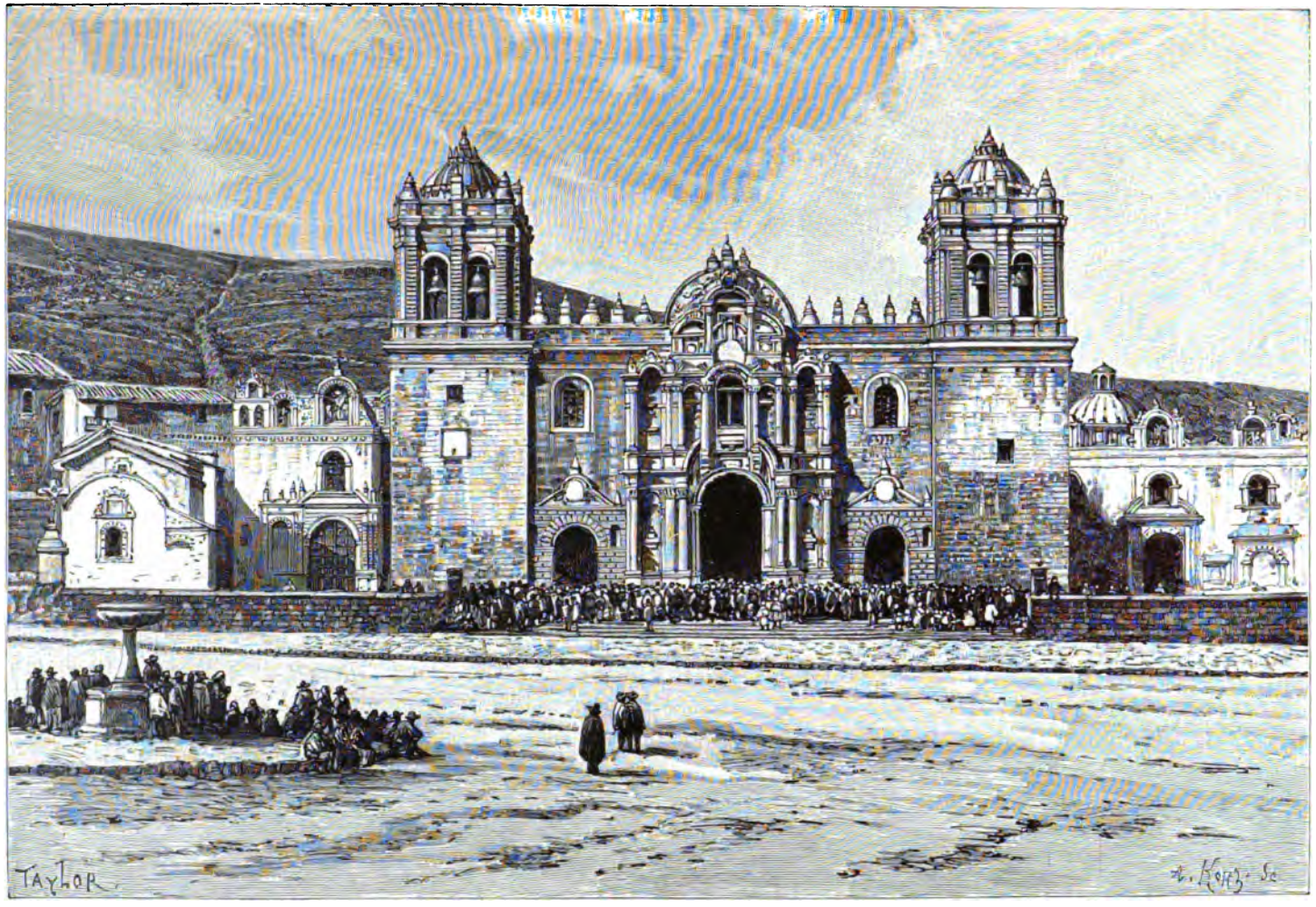
Scale 1 : 20,000.



875 Yards.

stone walls, as if built for fortresses, while the light superstructure with its red-tiled roof reveals its modern origin. Most of the temples and palaces still survive in analogous form, serving as foundations to the present churches, convents, warehouses and private mansions. These old structures were concentrated especially along the banks of the Huatanay, or western torrent, and here the observer admires the wonderful accuracy with which these undressed cyclopic blocks were put together. Formerly many of the houses were decorated with plates of gold both on the inner and outer surfaces.

On one side of the great square stands the cathedral, a Spanish structure in bad taste, but prodigiously rich in the interior, as if to efface the memory of the old



CATHEDRAL OF CUZCO.

BUILDINGS OF THE INCAS ON THE CERRO DE LAS CARCELES AT OLLANTAI-TAMBO.

temple of the Sun, which contained a solid gold image of the day-star. Amongst the scientific and literary institutions are a university, a library and a museum of antiquities.

From the archæological standpoint the eminence overlooking Cuzco is fully as interesting as the city itself. On the first terrace are seen the ruins of the Colcampata palace, attributed by tradition to Manco Capac, first of the Incas, reputed civiliser of the Quichuas. But however this be, the remains present extremely curious architectural features, particularly in their recesses and doorways, resembling the pylons of Egyptian temples. A much weathered figure of a siren projects in one place beyond the face of the wall.

On the crest of the hill, rising 745 feet above the square, stands the citadel of *Sacsahuaman*, which was erected by the great chieftain Viracocha. It comprises three concentric ramparts formed by blocks of a dark limestone, which are joined together as nicely as the cubes of a piece of Roman mosaic-work. The walls, which have been partly demolished and rolled down block by block to the foot of the hill as building materials for the modern city, were disposed at projecting and receding angles, so as to present two fronts to the enemy advancing from any single point. Here the Incas long held out against the Spanish force led by Hernando Pizarro. Near Sacsahuaman rise the steep rocky slopes of Rodadero, carved into flights of steps, seats, and terraces. From both hills a splendid view is afforded of the city, the surrounding verdant plain dotted over with villages, the smiling Vilcanota valley, the white cone of Azungato, and in the distance the frowning heights of the snowy cordillera.

The Spaniards had entered Cuzco in 1532, and for the natives the anniversary of the Conquest long remained a day of mourning. Years after the event the old men on that day laid their ears to the ground, listening for the roaring waters which were suddenly to rise from the underground lake and overwhelm the invaders. During the religious processions, when the multitude devoutly followed the great crucifix of *Nuestro Señor de los Temblores*, prayers may even have been addressed to the "Lord of Earthquakes" to overturn the desecrated city.

Nowhere else has the old cult left so many memories in the hearts of the people. During lunar eclipses the women implore Father Sun with much moaning not to devour Mother Moon. Under the Spanish rule many noble families had gradually given an aristocratic air to the old Inca city; but after the War of Independence nearly all emigrated, and most of the old palaces, more or less debased, are now occupied by Quichua half-breeds. But a revival must take place when the ancient City of the Sun will be placed in direct railway communication with the Pacific Ocean by the Arequipa line.

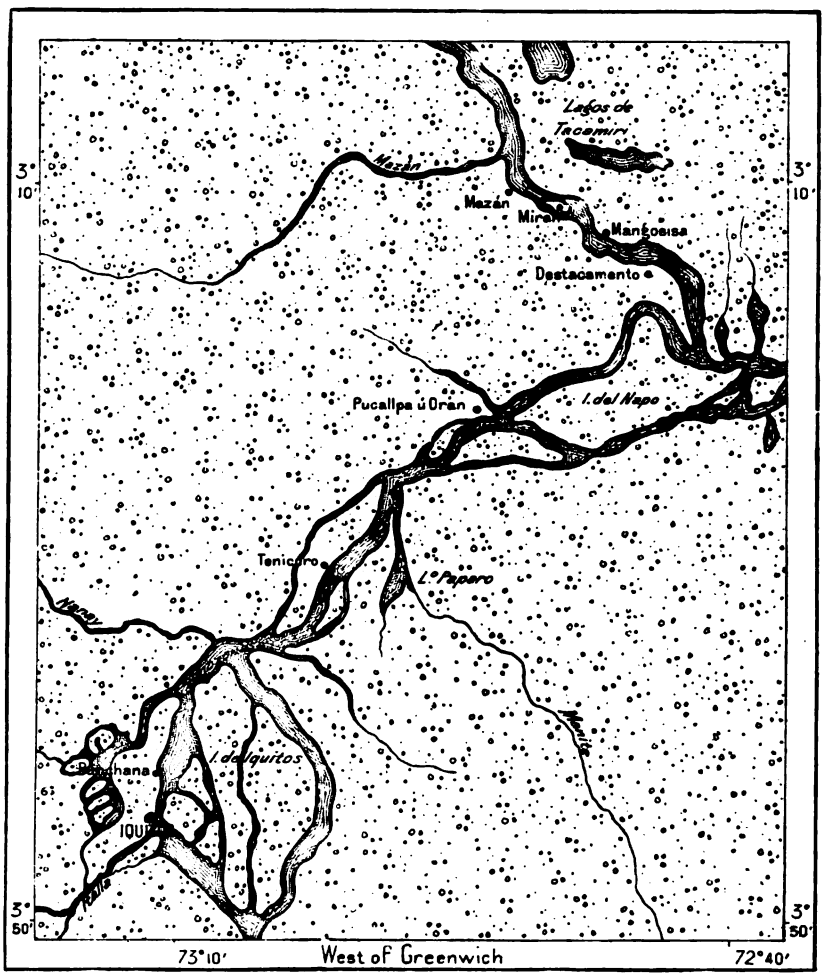
Ollantaï-tambo—Sarayacu—Omagua.

Ruins are also numerous in the environs. The original kingdom of the Incas, at first of small extent, was here defended by fortresses, whose remains are still seen on the Apurimac, the Vilcanota and the Paucartambo. Ollantaï-tambo,

most imposing of these strongholds, which is reached by crossing the Vilcanota, between *Maras* and *Urubamba*, may still be regarded as marking the frontier of Peru, properly so called. Beyond it nothing is seen except a few obscure villages, hamlets, farmsteads or Indian huts. Civilisation is advancing timidly to the

Fig. 132.—Iquitos and the Napo Confluence.

Scale 1 : 750,000.



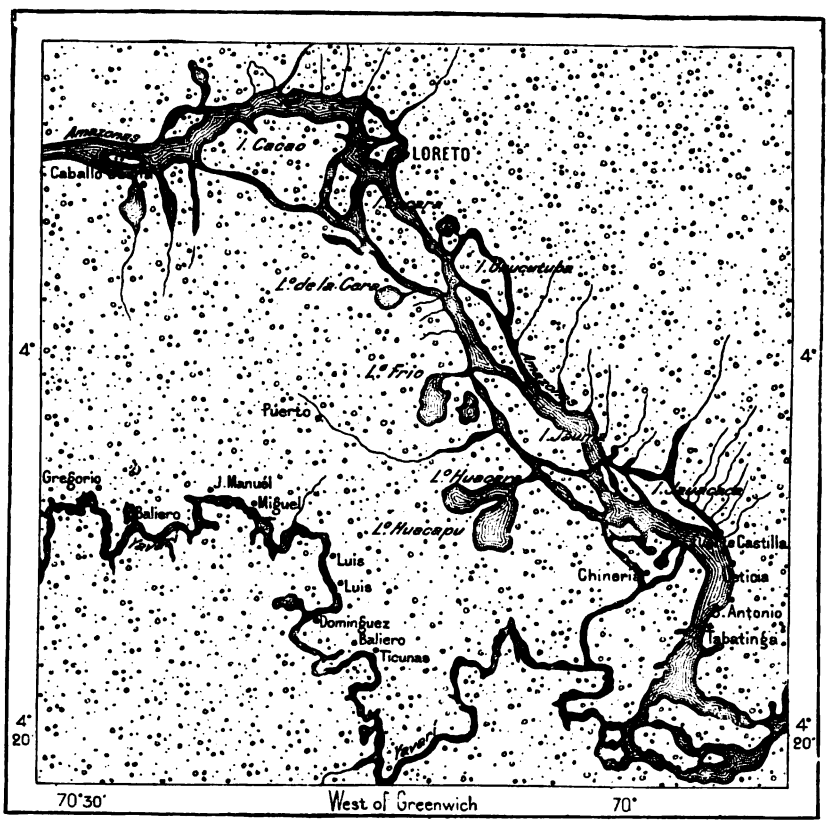
re-conquest of this fertile valley, which was wasted in the eighteenth century by the Chuncho natives, who burnt no less than 115 plantations.

Sarayacu, the chief riverine port of the lower Ucayali, lies on a lateral creek, where some Franciscan missionaries have gathered round them Indians of various tribes—Piros, Cachibos, Orejones—who have adopted neither Spanish nor Portuguese, but Quichua as the language of general intercourse. Here the traveller enters the lowlands at an altitude of not more than 544 feet above the Atlantic, and steamers easily ascend from the Amazons to Sarayacu.

At the confluence of the Marañon and Ucayali, the two main head branches of the Amazons, the village of *Nauta* is perched on a cliff which rises some 34 feet above low-water level. Founded in 1830 on the site of an old mission, this little group of straw huts is inhabited by the Cocamas Indians and a few half-breeds; it is far from possessing the importance to which its geographical

Fig. 133.—Loreto, Amazons-Yavari Confluence.

Scale 1 : 750,000.



position would seem to entitle it; but it has lost all its trade by a shifting of the channel and the formation of broad alluvial banks.

At long intervals along the margin of the great river follow other ports, such as *Omaguas*, so named from a colony of Omagua Indians, who have since been replaced by numerous half-breeds of diverse origin; *Iquitos*, which was founded in 1862, and rapidly developed a considerable trade, and at present metropolis of the Amazonian Montaña; *Oran*, situated below the Napo confluence; *Pebas*, *Cochaquines*, both at first exclusively Indian missions; *Sancudo*, and lastly, *Caballo-cocha*, which till recently was an obscure village, but is now growing at the expense of *Loreto*, an ancient settlement inhabited by a few Ticuna Indians, skilled in the preparation of the curare poison.

Steamers call regularly at these Upper Amazons ports, and the dealers who have settled in the district, for the most part Brazilians or Portuguese, collect all the local produce—rubber, tobacco, fish, sarsaparilla, wax, Moyobamba hats—which is brought down by the Indian boatmen by the Napo, Pastaza, Marañon, Ucayali and other Amazonian headwaters.

Sandia—Puno—Yunguyo.

Sandia, beyond the snowy Carabaya range towards the Brazilian frontier, lies in one of the most auriferous districts of the New World. Prospectors have estimated at many millions the quantity of the precious metal contained in the alluvia of its running waters, which flow north-east through the Manu (Madre de Dios) to the Beni affluent of the Madeira. But the absence of roads, or even tracks, through the surrounding forests prevents the exploitation of these treasures. It was in the Carabaya woodlands that Clements Markham discovered the cinchona-plant in 1860, which was afterwards successfully acclimatised on the uplands of Southern India.

Although lying on the west slope of the range, *Crucero* has been chosen as the capital of the province of Carabaya. It stands at an altitude of 12,970 feet, on a torrent which flows southwards in the direction of Lake Titicaca. In the same valley, but much nearer to the lake, is situated the more important town of *Azangaro*. Here are some ancient ruins, including a round tower which till recently was covered with an old Peruvian roof of reeds and short thatch, the only one of the kind still in existence at the time of its destruction. According to all the local traditions, Azangaro was the place where the Quichuas buried the heaps of gold, valued at nearly £1,000,000, which they were bringing to Pizarro for the ransom of Atahuallpa.

By its junction with the Pucara the Azangaro river forms the Ramiz, chief affluent of Lake Titicaca. The Pucara, descending from the Vilcanota Knot, is skirted by the railway running from Arequipa towards Cuzco, and crossing the cordillera at the Raya Pass (13,090 feet) near *Santa Rosa*. *Pucara* ("The Fortress"), the most flourishing place in the valley, stands at the foot of a reddish sandstone cliff 1,316 feet high, pierced with clefts and cavities, around which hover clouds of birds.

Below Pucara the railway still follows the river valley as far as *Nicasio*, beyond which, trending southwards, it turns the northern extremity of Lake Titicaca, passing by *Lampa* to reach Juliaca, near an inlet of the lake, 12,670 feet above sea-level. Juliaca, the frontier town towards Bolivia, cannot fail to acquire great importance as the central station of lines branching off in one direction towards Cuzco, in another through *Puno* towards La Paz.

In the seventeenth century the Puno mines were amongst the most productive in the New World; but the owner of one of the lodes having acquired enormous wealth, the greed of the impecunious viceroy was excited. The "millionaire" was accused of treason, condemned and executed, and the very day

of his death, saith the legend, the galleries were flooded, or else the entrances choked by the Indians. All subsequent efforts to re-discover the rich lodes have failed, although a little silver still continues to be extracted from the mines.

In connection with the Pacific Railway, Puno maintains a number of steamers on the lake, besides a whole flotilla of *balsas*, made entirely of reeds and propelled by a reed sail. On a neighbouring island is the grave of the distinguished North-American traveller, Orton. In the eighteenth century Titicaca was often called the Lake of *Chicuito*, from a place lying farther south on the west side, which, before the insurrection of Tupac Amaru, was a flourishing town; but it was plundered and partly destroyed during the war, and never recovered from the disaster.

On the headland of Sillustani, at the little Lake of Umuyo, near Puno, are some megalithic granite circles which, of all Aymara monuments, most resemble the menhirs and other similar pre-historic remains of West Europe. Near the south-west extremity of Lake Titicaca the town of *Yunguyo*, formerly a holy place, situated on the low Copacabana peninsula, still attracts all the surrounding populations to its market, which appears to date from pre-Inca times.

VIII.

Material Condition of Peru.

The population of Peru, consisting for the most part of full-blood or half-caste Indians, has increased less rapidly than that of the other American republics; in some of the more remote upland districts it may even have diminished, owing to the attraction of the large towns. Nevertheless, the increase has been about threefold since the War of Independence—from a little over 1,000,000 in 1810 to nearly 3,000,000 in 1876. The losses caused by the war with Chili have already been more than repaired, and at present (1894) the population certainly exceeds 3,000,000, of which the civilised Quichua element, pure or mixed, is in a decided majority. The uncivilised Indians were roughly estimated at 350,000 in 1876.

It may be doubted whether the creoles, that is, the whites of pure Spanish descent, have yet been completely acclimatised on the insalubrious coastlands, where the mortality of infants is still excessive. Convulsions especially are very fatal, as is also the "seven-days sickness," so called because it attacks infants in the first week after birth, always with deadly result. Yellow fever has also frequently invaded the coastlands, sparing the negroes, but proving more dangerous to the Indians than to the whites. Typhus and typhoid fever prevail on the hot lands, and, as in most torrid climates, intermittent agues and dysentery, often complicated by liver complaints, ravage the coastlands.

According to Tschudi, no country presents so many peculiar forms of disease as Peru; every valley has its special ailment, unknown in the neighbouring

districts. On the uplands, all strangers, and even the natives, suffer, either directly or indirectly, from the *soroche*, caused by the rarefaction of the air, and assuming different forms in different localities. The mining districts rich in antimony are specially dreaded, and certain domestic animals suffer even more than travellers from mountain-sickness. Above 13,000 feet, dogs never survive beyond a twelvemonth, while cats die in horrible convulsions a few days after their arrival.

On the other hand, some ailments contracted on the lowlands are cured in the mountains. Dysentery stops almost immediately, and consumption—rare amongst the upland Indians—is arrested and even disappears, provided the patients take care to accustom themselves gradually to the more rarefied air of the elevated regions. Thus, although Oroya may be reached from Lima in a single day, the journey has to be made by at least twelve or fifteen stages.

Agriculture.

In former times Peruvian agriculture was certainly of far greater importance than at present. The so-called *andenes*, steps or terraces, now lying fallow, but still girdling the mountain slopes up to the vicinity of the snow-line, and the astonishing irrigation works, drawing the fertilising waters from the rocky upland valleys down to the plateaux, attest both the density and the remarkable industry of the old populations. In those days agriculture served only to supply the local wants, and to entertain a little exchange of commodities between the lowlands and the elevated regions of the Sierra.

The produce was mainly restricted to two alimentary plants—maize in the temperate lands, and higher up *chenopodium quinoa*, the seeds of which were ground to flour or boiled like rice. Various species of the potato, such as *curo* or *papa*, were also cultivated, besides arracacha, ulluco (*ullucus tuberosus*), and oca (*oxalis crenata*). Certain choice varieties, like the "Cuzco" maize, developed with marvellous art, were grown only for the Inca's table. For kings and nobles was also reserved the use of coca, although the leaf was occasionally distributed among the common people. In recent years the cultivation of this plant has been revived and extended, especially on the Amazonian slopes, and exported to Europe for the preparation of cocaine.

Wheat and barley were introduced from Spain, and bananas from the Canaries, this last by the same Bishop Tomas de Berlanga to whom we owe the discovery of the Galapagos archipelago. Bernabé Cobo relates that in 1543 Lima was already surrounded by banana-groves, but an invasion of ants having consumed all the supplies in the city, the calamity was attributed to these plantations, which were consequently ordered to be rooted up under a fine of ten gold crowns. The vine and olive made their appearance some years later; but since 1551, when the first bunch of grapes was gathered at Lima, viniculture has been mainly confined to the southern provinces, and especially to the districts of Ica and Moquegua.

Cotton, which was grown to some extent during the American Civil War, has

since been mostly replaced by sugar-cane, which succeeds well in the equable climate of the Pacific seaboard. Next to sugar, which is forwarded chiefly to Great Britain, the wool and hair of sheep, llamas and alpacas, form the most important articles of export from the farmsteads, the department of Puno alone forwarding from £120,000 to £200,000 worth annually. On the low-lying coast-lands horned cattle do not thrive, and here the livestock consists exclusively of horses, asses, swine and mules; as a pack-animal the llama is being gradually replaced by the mule, which carries a four times heavier load twice the distance at a stretch, and which is, moreover, more manageable and much more easily bred.

Despite political revolutions, the system of large estates still prevails in Peru, where some of the great proprietors possess domains 80 or 100 leagues in circuit, yielding 5,000 or even 10,000 tons of sugar, or else affording pasturage for 100,000 sheep. Nevertheless, the Government, in the hope of attracting foreign settlers, has from time to time attempted to create small holdings, by distributing unoccupied lands in lots of 300 acres, and even less. But the best lands on the Amazonian slope have already been ceded to an English syndicate with almost sovereign rights.

Mineral Wealth.

Peru no longer holds the first rank as a mining country, having already been far outstripped, not only by the United States and Australia, but even by Bolivia and Chili in South America itself. Nevertheless, the whole region may still be regarded as a vast storehouse of the metals. It would be almost impossible, writes Raimondi, to point to a single district in Peru proper which does not possess deposits of some mineral or of some substance valuable as fuel or for other purposes.

In the distribution of these treasures a certain contrast may be observed between the coast region and both of the main ranges. The "Andes," that is to say, the Eastern Cordillera, consisting mainly of Silurian strata, contain gold in their schistose quartz veins, while the torrents descending their flanks to the Amazonian regions wash down numerous pyrites. The Western Cordillera, which separates the inter-Andean plateaux from the seaboard, is poor in gold, but abounds in silver lodes, with endless ramifications wherever the dioritic rocks are found in contact especially with Jurassic limestones. Here the silver ores are nearly always associated with antimony, copper and lead, though copper occurs in greatest abundance on the coastlands. In this maritime zone vast spaces are impregnated with salt, nitrate of soda, borax, petroleum, and till lately the cliffs and neighbouring islets were covered with thick beds of guano. In the Ancachs valley there is an untouched store of coal belonging to the Jurassic period.

The annual yield of gold is small, owing to the fact that the richest places occur in the least healthy, the most remote and inaccessible regions of the Montaña. Hence silver remains the chief mineral product of Peru, and to it some towns, such as Cerro de Pasco and Hualgayoc, owe all their importance.

Quicksilver, which formerly enriched the city of Huancavelica, is now obtained only in small quantities. The falling off in the production of this and other minerals is partly explained by the economic conditions of the market, the

Fig. 134.—Mines of Peru.

Scale 1 : 20,000,000.

Gold. Platinum. Silver. Copper. Tin. Lead. Iron. Salt. Cinnabar.

Coal. Nitrate. Guano. Asphalt. Petroleum.

500 Miles.

difficulties of transport and the competition of the United States, Australia and Transvaal. Nevertheless, the mining industry has received a fresh stimulus since the state mines have been ceded to the English creditors of the Government.

Being of quite recent origin, the petroleum industry has not yet acquired any great development, despite the extensive reservoirs discovered south of Tumbez, and in the neighbouring districts of Payta and Sechura. Nevertheless, mineral oil is already employed by the local railways and steamers, as well as in many sugar refineries. In 1885 the total yield was estimated at 21,000 tons, not more than two per cent. of that of the United States, whose reservoirs are less copious than those of Peru. To encourage the industry, an Act of Congress, passed in 1890, exempts from any fiscal charges the output for twenty-five years. It is hoped that this new source of wealth may replace the exhausted guano-beds and the borax and nitre regions wrested by Chili from Peru by right of conquest.

Trade and Industries.

The manufacturing industries possess no importance, being mainly confined to the coarse woollen fabrics and earthenware prepared by the Quichuas of the plateaux for local consumption, and to the hats, filigree and other fancy articles manufactured by the artisans of Moyobamba and a few coast towns. Modern industry is represented only by a cotton-mill and various little factories, centred chiefly at Bellavista, near Callao. Hence machinery and wares of all kinds have to be imported from Europe and the United States in exchange for silver ores, sugar, wool, nitre and other local produce. In this foreign trade Great Britain holds the first place, followed by France, Germany, the United States and Chili in the order named. The imports and exports average, collectively, about £3,200,000, of which £2,200,000 fall to the share of England.

Till recently Peru possessed an insignificant mercantile navy of somewhat less than 12,000 tons burden; but foreigners having obtained the right to naturalise their vessels, this little fleet was suddenly enlarged to a considerable extent. But the deep-sea navigation remains in the hands of foreigners; more than half of the ships engaged in the ocean carrying trade fly the British flag, Chili owning the larger part of the rest, which is divided between Germany and France. More than half of the traffic is concentrated in the roadstead of Callao.

Communications.

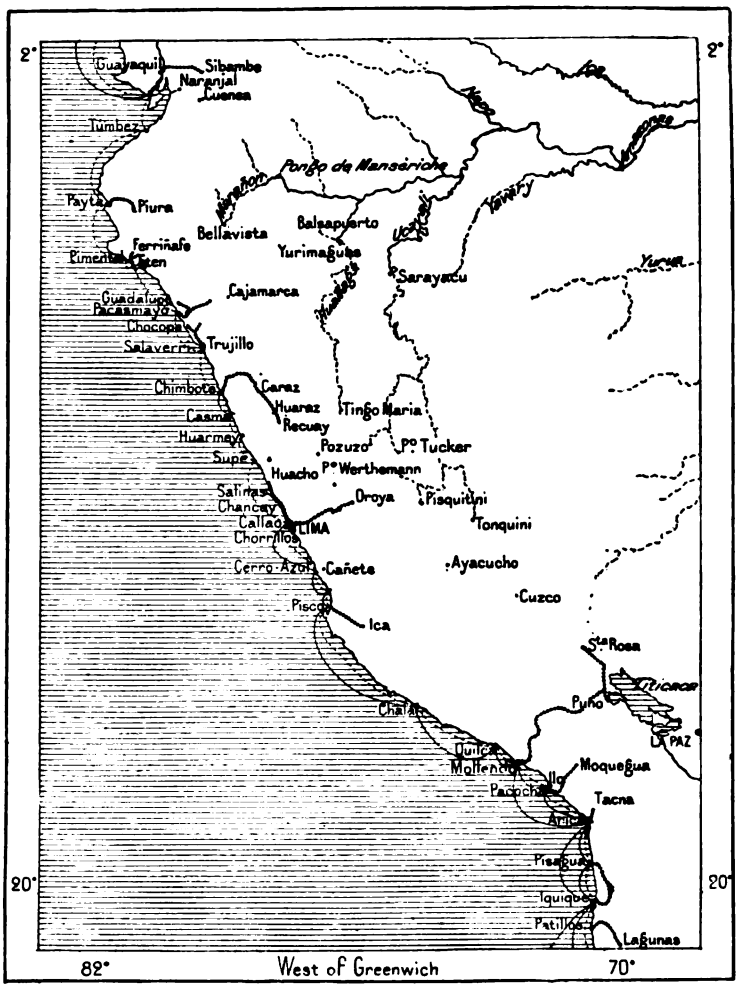
Peru already possesses numerous sections of a railway system, which jointly far exceed in length the carriage-roads of the country. Not only Lima, but most of the larger inland towns on the Pacific slope, are connected by rail with their seaports. Even the arduous attempt to surmount the barrier of the Western Cordillera was made, at a time when the profits of the guano trade rendered the expense a question of minor importance. Over £20,000,000 were employed in this undertaking, an enormous sum for a population of 3,000,000, scattered over a vast area.

The original plan was to push forward the northern, central and southern trans-Andean lines; the first running from Pacasmayo through Cajamarca to the

upper Marañon; the second forming a junction with the Callao-Lima line to reach the Rio Jauja valley and ramify thence over the inter-Andean plateaux; the third starting from Mollendo and climbing the slopes to Arequipa, then crossing

Fig. 135.—Communications of Peru.

Scale 1 : 18 000.000.



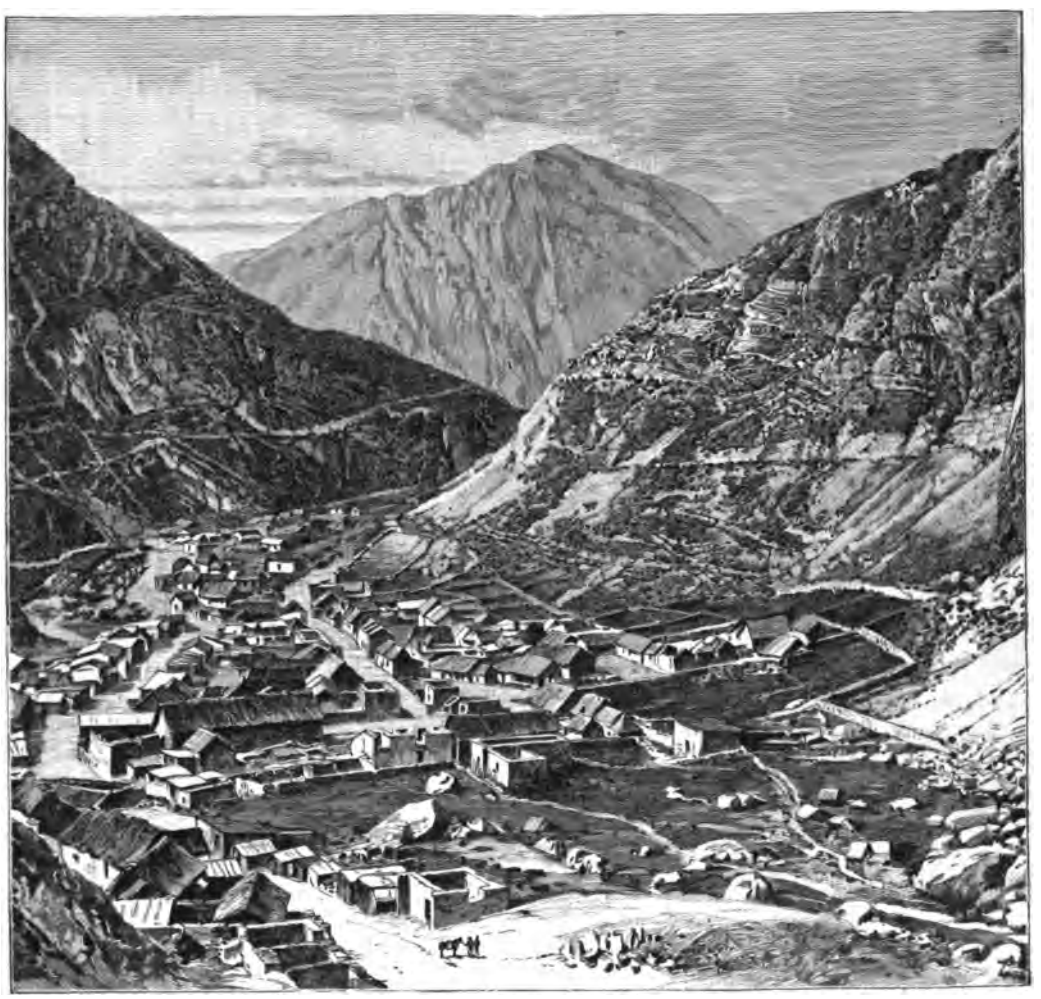
the cordillera and descending to Puno, here sending off two branches, one towards Cuzco, the other towards Bolivia.

Of these three trunk lines, the southern made most rapid progress, and before the disastrous Chilian war the section between the coast and Lake Titicaca was already finished. The Lima route had reached the crest of the Andes by an

incline which is a triumph of engineering skill; but it had not yet connected the capital with any important place on the plateaux. Lastly, the Pacasmayo line had not yet surmounted the gorges of the Rio Jequetepeque.

These undertakings were arrested by the war, and several lines, deprived of their rolling-stock, were abandoned, and fell out of repair. After a decade of inaction the work has been slowly resumed, and in 1892 the Arequipa-Puno line

Fig. 136.—Lima-Oroya Railway: View taken at Chicla.



completed its northern branch over the Vilcanota Pass as far as Sicuani. At three points it attains an altitude of over 13,000 feet, rising at the Raya Pass to 14,180 feet. But the Oroya line crosses the cordillera at the still higher elevation of 15,650 feet.

But much remains to be done before the system can be regarded as even roughly completed. Lines are especially needed to connect the navigable Amazonian rivers with the Pacific seaports, where the transport of goods varies

at present from £40 to £80 per ton, according to the season and the nature and bulk of the wares. A first section in construction of the Oroya line is intended to run through Tarma and down the Rio Perene valley to the Ucayali, and thence over a lateral pass to the Unini basin. A second, starting from Ayacucho, is projected to descend northwards by the Rio Mantaro valley to the Apurimac-Tambo confluence.

Lastly, a continuation of the branch now advancing from Lake Titicaca towards Cuzco is planned to turn the rapids of the Urubamba, and thus reach Tonquini at the entrance of the defile where the headwaters escape to the plains. These various riverine ports, standing at a mean altitude of not more than 1,000 feet above the Atlantic, from which they are distant 3,300 miles, would offer more advantages than Callao for forwarding the produce of the Sierra. An English company has already undertaken to complete the whole system, the first sections of which were constructed with the badly administered resources of the nation.

The telegraph lines are in a much more forward state, and already extend to the remotest provinces of the republic. The officials sent to administer this department in the distant Amazonian regions find it more convenient and far less expensive to proceed to their posts not directly across the Cordilleras, but by the sea route from Callao to Panama, then across the Isthmus to the Caribbean Sea, and so on by large steamers to Para, and thence by smaller boats up the Amazons to Loreto.

But the number of telegraph despatches, as well as of letters forwarded through the post, continues to be insignificant, owing to the backward state of education. Although public instruction is "free and obligatory," the great majority of the pure and mixed population has no knowledge of letters. In 1890 not more than one-fortieth of the inhabitants were attending the primary schools, though secondary establishments, both public and private, are numerous. Peru possesses as many as three "Universities," those of Lima, Cuzco and Arequipa.

IX.

Administration.

As in Ecuador and Colombia, the Government shows centralising tendencies. The electorates of the different territorial divisions have but little influence, while the ruling body seated at Lima, regarding itself as the heir of the Spanish viceroys, takes advantage of the natural docility of the Quichuas to act independently of the popular will. Even the various revolutions were caused, not by the sufferings of the people, but mainly by military aspirants to office and provincial rivalries. Hence the constitution has frequently been suspended in the interest of absolute dictators.

The suffrage, nominally universal, is *de facto* extremely limited, the whole of

the illiterate class being excluded, as well as those owning no property or paying no taxes. Deputies and senators also must be of a certain age, 25 or 35 years, and possess an independent income of 500 or 1,000 dollars. The Senate is composed of provincial deputies, in the proportion of one for every 30,000 inhabitants or fraction exceeding 15,000; the House of Representatives is nominated by the electoral colleges of the provinces into which the departments or main political divisions are divided—two members for each of the provinces where there are two only, and one member more for every other two provinces. Thus, if the department has two provinces, it will be represented by four members; but if it has four, by six only.

The President, who possesses great power, especially if he happens to be a general popular with the troops, is nominated for four years by the delegates of both Houses. He is assisted by a cabinet of five ministers—council, justice, foreign affairs, finance, and war—all nominated by himself and at his pleasure. He also appoints and deposes the departmental prefects and the provincial sub-prefects, and chooses the judges from six candidates presented by the Supreme Court.

A Vice-President replaces the President in case of illness or death, and may himself be replaced by a second Vice-President appointed by election. The electoral colleges choose the municipal councillors and the deputies of the provincial assemblies. Catholicism is the state religion, and although other cults are tolerated they cannot be exercised publicly.

The yearly budget is only one-fourth of what it was before the Chilian war, when it still enjoyed the sale of guano and the nitrates. The taxes, nearly all of an indirect character, comprise in the first place the customs, and then the sale of what guano remains, and further the profits of the postal, telegraph and railway services, the charges on the sale of property and legacies, patents, stamps and powder.

The public foreign debt, contracted in England in 1870 and 1872, originally represented a sum of £31,580,000; on which, however, no interest has been paid since 1876, so that in 1889 the whole of the liabilities were stated to be about £40,000,000, of which nearly half was represented by an enormously depreciated paper currency. Before the withdrawal of this paper, the *sole*, or dollar, nominally worth 4s, had fallen to 2½d. In virtue of a convention concluded with her English creditors, the so-called "Grace-Donoughmore" contract, finally ratified in 1890, Peru is relieved of all responsibility for the 1870 and 1872 debts, ceding to the bondholders in return all the state railways, guano-beds, mines and unoccupied lands for a period of sixty-six years. The creditors undertake on their part to complete and extend the existing railways, thus, so to say, taking the place of the Government so far as regards all useful and profitable public works, and leaving to the state the administrative functions and the pomp of office. In modern times this is the most signal instance of state control transferred to capital and enterprise.

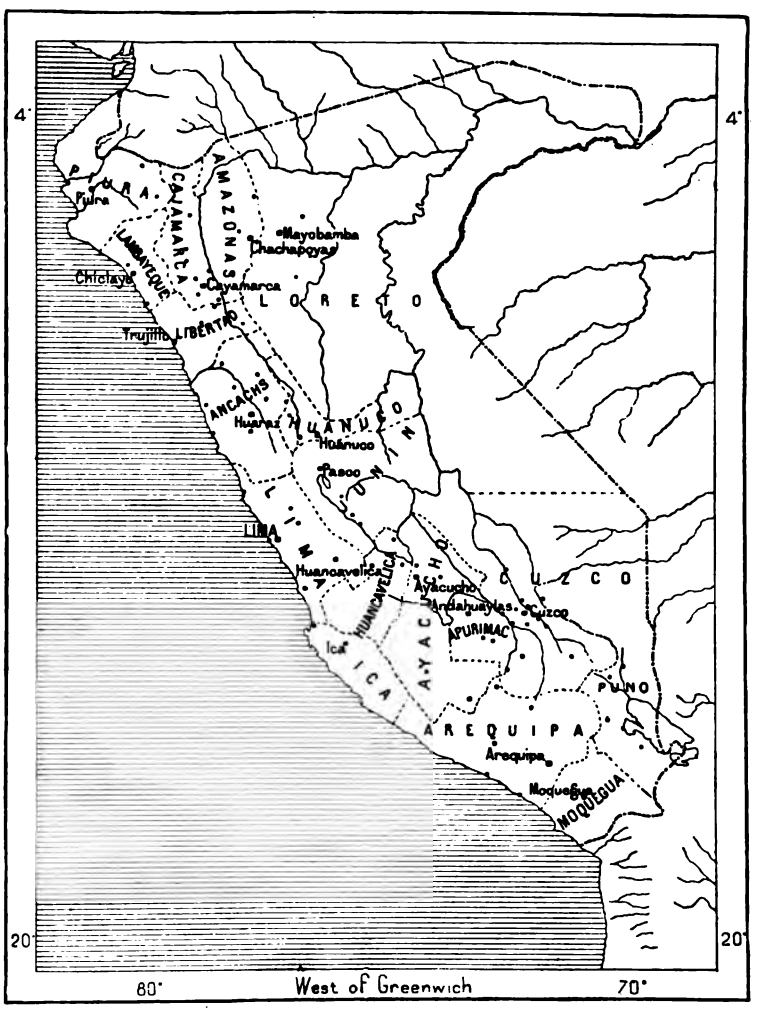
The army, which has contributed so much to increase the public burdens,

comprises a peace footing of over 3,000 men, with a nearly equal number of gendarmes, and a war force of 40,000 of all arms. Before the Chilian war Peru had a really formidable navy, which is now reduced to a few vessels of small tonnage.

There are eight ecclesiastical divisions (dioceses):—Chachapoyas, Trujillo,

Fig. 137.—Administrative Divisions of Peru.

Scale 1 : 16,000,000.



Huanuco, Lima, Ayacucho, Cuzco, Puno and Arequipa; and nine judicial circuits:—Cajamarca, Piura, Trujillo, Huaraz, Lima, Ayacucho, Cuzco, Puno and Arequipa.

The departments, as the administrative divisions are officially called, coincide neither with the judicial circuits nor with the ecclesiastical dioceses. Formerly

eighteen, they were recently increased to nineteen by the addition of Callao, which, owing to its growing importance, has been detached from Lima, of which it formed one of the seven provinces, and is now constituted a department. The number of provinces into which each department is subdivided differs greatly, some having only two or three, others as many as eight or even ten. In the distribution of the franchise this is an important consideration, as the representation of the departments does not increase uniformly with the number of their provinces. Thus a department with two provinces will have four representatives, whereas one with three provinces will have five only, not six, which would be the proportionate number.

For details of areas and populations, see Appendix.

CHAPTER VIII.

BOLIVIA.

I.

Boundaries—Extent.

THE former territory of Charcas or "High Peru," which depended on the viceroyalty of Buenos Ayres from 1776 till the War of Independence, and which constituted itself a republic under the name of Bolivia, in honour of Bolivar, presents of all the South American states the most eccentric political frontiers. On the conclusion of the struggle with Spain, Bolivia had already been sacrificed to Peru, to which were assigned her natural communications with the sea. She sustained a still greater loss when she was deprived by Chili of the roundabout route by which the coast could be reached from the Bolivian plateaux. The little section of the seaboard owned by her before the Chilian war lay almost beyond her territory proper, at its south-west extremity, and separated from the better-peopled inland provinces, not only by the volcanic cordillera and the parallel coast ranges, but also by arid, uninhabitable desert spaces. Hence this remote and almost worthless region was little utilised by Bolivian commerce, and all the foreign trade passed through the Peruvian seaports of Islay, Mollendo, Arica, Pisagua and Iquique.

But despite their inhospitable character, these coastlands were, unfortunately for Bolivia, extremely rich in nitrates and other chemical substances of great value in the modern industries. A war, caused by a conflict of interest in these mineral treasures, broke out between Chili and Peru; Bolivia, unable to remain neutral, lost the stakes, and being the weakest of the three states, suffered most.

In virtue of an "indefinite truce," Chili seized all the coast provinces, and took the place of Peru as the intermediary of Bolivian commerce. Henceforth Bolivia has to forward her produce through the Chilian seaports of Iquique and Antofagasta.

On the north-east the frontier towards Peru coincides fairly well with the

ANTOFAGASTA—VIEW TAKEN FROM THE QUAY.

ethnical parting-line between the Quichuas and the Aymaras, although here also Peru encroaches on her weaker neighbour, so as to appropriate Puno and other Aymara towns. The natural geographical limit indicated by the Vilcanota Knot between the Amazonian affluents and the Titicaca basin is deflected far to the south; even the lake itself has been divided in an oblique direction in such a way as to leave the larger section to Peru.

At the southern extremity, also, the political boundary runs counter to the natural divisions, although here Bolivia would appear to be favoured at the expense of her Argentine neighbour. If the formal will of the inhabitants were not the first consideration in these matters, the province of Tarija, at present included in Bolivia, should be restored to Argentina, lying as it does to the south of the Rio Pilcomayo, in the upper Bermejo basin. By a royal decree Tarija had been attached to Salta for civil and ecclesiastical purposes, and this union with the Argentine city continued from 1807 to 1825, when the new Bolivian republic was constituted. Then, however, the municipality of Tarija expressed a wish to be incorporated in the new state, and, despite the protests of the Argentine diplomatists, supported by Bolivar's decision, the Bolivians have continued to occupy the old dependency of Salta.

On the northern and eastern plains, as well as in the slightly broken regions of the divide between the Amazons and the Plata, the Bolivian territory stretches to vast distances beyond the elevated plateaux which constitute Bolivia proper. At present these boundless spaces have a merely nominal value, and add nothing to the strength of the country; but here as well as on the Pacific slope Bolivia has lost a part of her domain. The more or less fictitious frontier between Spanish and Portuguese America has never ceased to shift westwards to the advantage of Brazil. Formerly the eastern boundary of Bolivia, indicated by the course of the Rio Verde, of the Guaporé, and of the Itenes (Mamoré), was continued along the Rio Madeira to San Antonio below the rapids, whereas it now stops at the confluence of the Mamoré with the Beni, about 130 miles to the south-west. After the triumph of Brazil over Paraguay, Melgarejo, President of Bolivia, surrendered to Brazil the riverine zone skirting the Paraguay "the space of twenty leagues," comprised between the Bahia Negra and Fort Olimpo on the right bank of the river.

Towards the south-west, however, the common frontier between Bolivia and Brazil still coincides with the course of the Paraguay as far as 22° south latitude, which parallel forms the conventional limit towards Argentina. On the north another conventional line, drawn from the Beni confluence to the sources of the Javari, corresponds to no real division, for these regions, still held by independent tribes, have hitherto been visited only by a few collectors of plants, rubber and sarsaparilla.

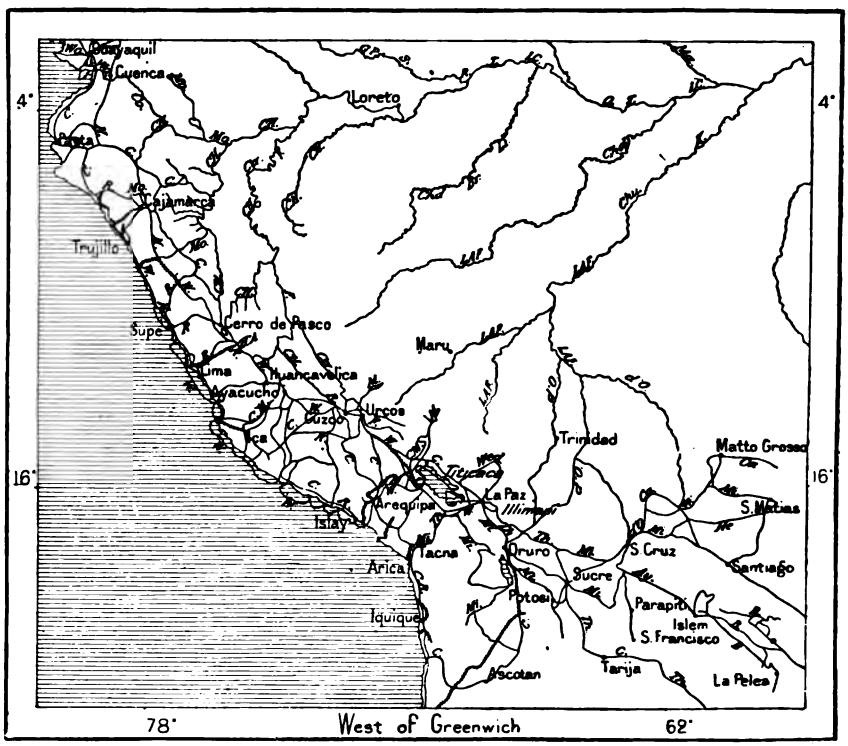
Geographical Research—Population.

With few exceptions, the exploration of Bolivia has been mainly the work of strangers. D'Orbigny made a special study of the Bolivian regions during the

years 1826-33. Twelve years later a group of explorers, under Francis de Castelnau, surveyed the fluvial districts between the eastern slopes of the Andes and the Brazilian forests of Matto Grosso. Pentland and Forbes devoted themselves more particularly to the peaks, chains and valleys of west Bolivia, with a view to determining their altitudes and geological constitution. Weddell traversed the mining districts in all directions, describing the land, its products and inhabi-

Fig. 138.—Chief Itineraries of Explorers in Peru and Bolivia.

Scale 1 : 27,000,000.



Explorers of the 16th century:—C., Conquistadores; G. P., Gonzalo Pizarro; O., Orellana.
" " 17th " S., De Sosa; T., Texeira.
" " 18th " He, Hervas; Ay., Ayolas; L.C., La Condamine.
" 1800 to 1850:—H., Humboldt; d'O., D'Orbigny; Ca., De Castelnau; Wed., Weddell.
" Modern:—R., Reyes; Cha., Chandless; Br., Brown; Ld., Lidstone; Chu., Church; K., Keller; M., Markham; W., Wiener; Mi., Minchin; Th., Thouar; B., Bravo; Mo., Monnier; L. A. F., Labre, Armentia, Fry; C.H., Hydrographic Commission; R., Raimondi; Wo., Wolf.

620 Miles.

tants. The engineer, Hugo Reck, explored many regions and prepared a map which, despite its date (1865), is still much valued. In 1875, Musters, Minchin and Cilley occupied themselves mainly with the geodesy of the land, determining the positions of most of the towns, mines and mountain passes. Wiener studied the people, their history and their works (1877); while Church, Keller, Labre and Armentia surveyed the vast network of running waters in the eastern basins. Crevaux, Thouar, Balzan, Fernandez, Stübel and others have also

contributed in recent times to determine the main geographical features, while the measurements of the engineers engaged in the mines, on the roads and railways have helped in the preparation of more accurate maps than those formerly in use.

Even after the encroachments of Brazil and Chili, Bolivia remains a vast domain at least four and a half times larger than the whole of the British Isles. But apart from the boundless wastes of the Amazonian woodlands, known only from the reports of travellers, Bolivia proper, where towns have been built, mines opened and roads constructed, comprises not more than a fourth of this domain, being mainly confined to the south-western region of the Andean plateaux with their border ranges and surrounding valleys.

Such are its natural resources, minerals and other products of the western uplands, agricultural produce and the valuable forest growths of the eastern slopes, that the inhabited section might become the privileged land of South America. But these resources still lie dormant, pending the arrival of settlers, the opening of highways and the development of the industries. Bolivia has been compared to a "silver table standing on pillars of gold." But these very mineral treasures have contributed to her impoverishment, by encouraging wasteful and indolent habits and the passion of gambling.

The population, estimated by one authority at over 2,500,000 in 1875, would appear, according to the last returns, based on nearly complete censuses, to fall short of 1,500,000. Wars, civil strife, the slaughter of the Indians, and especially epidemics have greatly retarded the natural increase, and even at times diminished the number of inhabitants. The malignant fevers which broke out amongst the Indians in 1866, and which spared the whites, caused a frightful mortality, sweeping away whole villages and leaving extensive tracts unpeopled for years.

II.

Physical Features.

Although, by the late rectification of frontiers, deprived of the Western Cordillera forming the outer edge of the plateau, Bolivia still comprises several peaks, which, although rising at some distance from the main axis, none the less belong to the border range. It also contains spurs and buttresses and parallel lateral ridges, which must be regarded as connected with the same system. Tacora (Chipicani) and, farther south, Sajama (21,000 feet), Tata Sabaya, Ullullu, Tahua, Sapaya, Tua, Aucasquilucha and Viscachillas, all stand within the Bolivian frontier, although dependent on the Western Cordillera, which continues the Peruvian Sierra and stretches southwards to the extremity of the continent.

The Bolivian Andes.

The Andes, properly so called, which comprise the loftiest summits of Bolivia, traverse this region for a distance of about eight degrees of latitude. The first

section, formed by the convergence of the Carabaya range with the crests stretching north of Lake Titicaca, usually takes the name of the "Apolobamba Knot," one of whose peaks rises to a height of 17,620 feet. Farther on the system broadens out in the direction of the south-east, rising from 6,500 to 8,000 feet above the eastern plains of the lacustrine basin, and penetrating above the snow-line, which in the Cordillera Real, as this section is called, stands at the enormous altitude of 17,250 feet. Towards the middle of the chain the three-crested Sorata, so named from the town at its foot, or Illampu, from a Quichua word meaning "snow," shoots up to 21,300 feet, according to the lowest estimate.

Illampu is followed along the main axis by other snowy peaks, such as Chachacomani, Huaina Potosi, Cacaca, Mesada and Illimani. Although it is now known to be overtopped by Illampu, Illimani, the second highest of Bolivian peaks, still remains the first for its imposing aspect and variety of outline.* Encircled at its base by tropical plantations, higher up by forests and crops of the temperate zone, it lifts into the clear atmosphere high above the clouds its three snowy peaks, one of which (not the highest) was scaled by Wiener in 1877, and by him named the "Pic de Paris."

At the foot of Illimani the Cordillera Real is interrupted by a deep fluvial valley, which, rising on the plateau west of the chain, pierces the main axis in an oblique direction close to La Paz, capital of Bolivia. Beyond the gorge Illimani is faced by Quimsa Cruz, the "Three Crosses." Here is the starting point of the southern section, which at a distance of about 200 miles from La Paz ramifies into two branches—the main range, which is deflected southwards parallel with the Western Cordillera and coastline, and an eastern chain trending away irregularly in the direction of the plains. The Cochabamba Knot, where the bifurcation takes place, culminates in the Cerro Tunari, 16,185 feet high. The whole space enclosed by the two ranges develops east of the western plateau a chaotic system of ridges and masses carved into numerous fragments by the headwaters of the streams, ramifying like the ribs of a fan, in one direction towards the Madeira, in the other to the Paraguay.

The southern continuation of the Cordillera Real, skirting the west side of the central Bolivian tableland, comprises several isolated groups and rocky ridges, which in some places run in two parallel lines. Here a number of peaks exceed 16,500 feet; Asanaque (16,840) is followed farther south by the still more elevated Michaga (17,390), and Cuzco (17,900) in the Cordillera de los Frailes.

Farther on broad gaps occur, beyond which the peaks fall to a lower altitude; Ubina is only 14,360 feet high, but Tuluma, culminating point of the Sierra de Chichas, overtops it by nearly 1,300 feet. East of the main axis Chorolque towers to a height of 18,450 feet, and this is exceeded by Guadalupe (18,870), Todos

* Measurements of Illampu and Illimani:—

Illampu:	21,310 feet . . .	(Pentland)	
,,	21,490 ,, . . .	(Minchin)	
,,	21,500 ,, . . .		
,,	21,430 ,, . . .		
,,	21,300 ,, . . .		
Illimani:	24,220 feet . . .	(Pentland)	
,,	22,230 ,, . . .	(Ondarza)	
,,	21,990 ,, . . .	(Reck)	
,,	21,246 ,, . . .	(Minchin)	
,,	20,970 ,, . . .	(Wiener)	

Santos (19,382), and Lipez (19,650). This last gives its name to the Lipez range, a transverse section connecting the Central with the Western Cordillera, and enclosing on the south the old lacustrine plains, whose deepest depressions are occupied by Lakes Titicaca and Pampa-Aullagas. Lipez thus corresponds in the south with the Vilcanota Knot on the north side of the same lacustrine region. In the middle of the plains rise some isolated masses, amongst others Tahua, which attains a height of 17,400 feet.

The "Bolivian Switzerland," which stretches east of the Central Cordillera in the direction of the plains, still presents some Alpine peaks, such as the Cerro de Potosi, which rises east of the city of like name to an altitude of 15,380 feet. But, as a rule, the elevation of the mountains corresponds to that of the plateaux on which they stand, and consequently falls gradually towards the eastern llanos. In this vast labyrinthine system the trend of the several ranges is extremely irregular, although they are mainly disposed in two directions parallel with the border chains; that is, the Cordillera de Cochabamba in the north, which runs first west and east and is then deflected towards the south-east, and in the east the Misiones range, continued by other ridges, which with Cochabamba form a sort of advanced rampart terminating at a right angle above the plains. The outer escarpments of these mountains are extremely abrupt, scarcely anywhere presenting accessible tracks; hence travellers descending from the uplands to the plains all take the river routes, trusting their lives to frail barks.

Some of the offshoots of the Bolivian Andes stand out with sufficient prominence to constitute distinct ridges beyond the region of the Cordilleras. Thus the Sierra Manaya skirts the right bank of the Beni, and the Sierra Chamaya takes a more northerly trend, while the Manaya is continued to the foot of the Cochabamba Alps, first by the Cordillera de los Mosetenes, and then by several "little Andes." Even in the heart of the plains there rise isolated groups of gneiss hills, which in remote geological times certainly formed part of the Andean system, from which they are now separated by the erosive action of rain and running waters. These groups, forming an advanced promontory of the Brazilian heights, have been collectively called the Chiquitos system, from the Indians of that name inhabiting their valleys.

Main Physical Divisions.

From the standpoint of its relief Bolivia falls naturally into four distinct regions. On the west the *alta planicie*, or "high tableland," as it is locally called, answers to the inter-Andean plateau of Peru, though much broader and far more uniform. This vast space, varying in altitude from 11,000 to 13,000 feet, stretches north-west and south-east between the two Cordilleras, from the Vilcanota to the Lipez Knot, a total length of over 500 miles, with a mean breadth of 80 miles, and a superficial area of some 40,000 square miles. On the east the Cordillera Real, with all the dependent chains and valleys, forms the most populous part of Bolivia, in which are situated nearly all the large towns. It is naturally divided into two

parts, the *cabeceras de valle*, the "valley heads," and the *valles*, the "valleys" themselves, expressions which in Bolivia have the special sense of temperate uplands and hot lands respectively.

The latter zone, comprising all the valleys merging in the plains, takes the general name of Yungas, formerly Yuncas, a term applied to all the hot regions and their inhabitants. In Peru the Yuncas were the coastlanders, whereas in Bolivia the word was applied to both the lands and peoples of the eastern slopes of the Cordilleras with the valleys and woodlands at their base. At present it is restricted to the lower margin of the Andes traversed by the affluents of the Amazons, and abounding in tropical products.

Lastly, the fourth region comprises the saddle-back extending as far as the Guaporé and the Paraguay, with its forests and savannas, its rivers and marshes, and its fertile lands, vast enough to supply bread-stuffs for many hundred thousand people.

III.

Lakes and Rivers of Bolivia.

Since the loss of its western (Pacific) slopes Bolivia drains partly to the Atlantic through the Amazons and Plate rivers, partly to the closed basin of the plateau, which has, at present, no seaward outflow. But within a probably recent geological epoch this upland basin also communicated with the Atlantic, being flooded by a lake much larger than the great lacustrine basins of North America and Central Africa. At that time the climate appears to have been much more humid than at present, and the whole depression was filled by an inland sea at a much higher level than Lake Titicaca, as shown by the mountains skirting the Oruro plain, where the overhanging whitish cliffs, apparently deposited in water, stretch 200 miles away to the north.

This vast mediterranean discharged its overflow through the breach where now stands the city of La Paz, and where rises one of the main headstreams of the Beni affluent of the Amazons. Thus at that epoch the largest river was fed by the largest lake in the world, while the gorges of the emissary skirted the foot of one of the loftiest summits in America. According to Minchin's measurements the present divide between the lake and the river stands at an altitude of 13,390 feet, that is to say, 515 above Titicaca and 1,450 above La Paz.

Lakes Titicaca and Pampa-Aullagas.

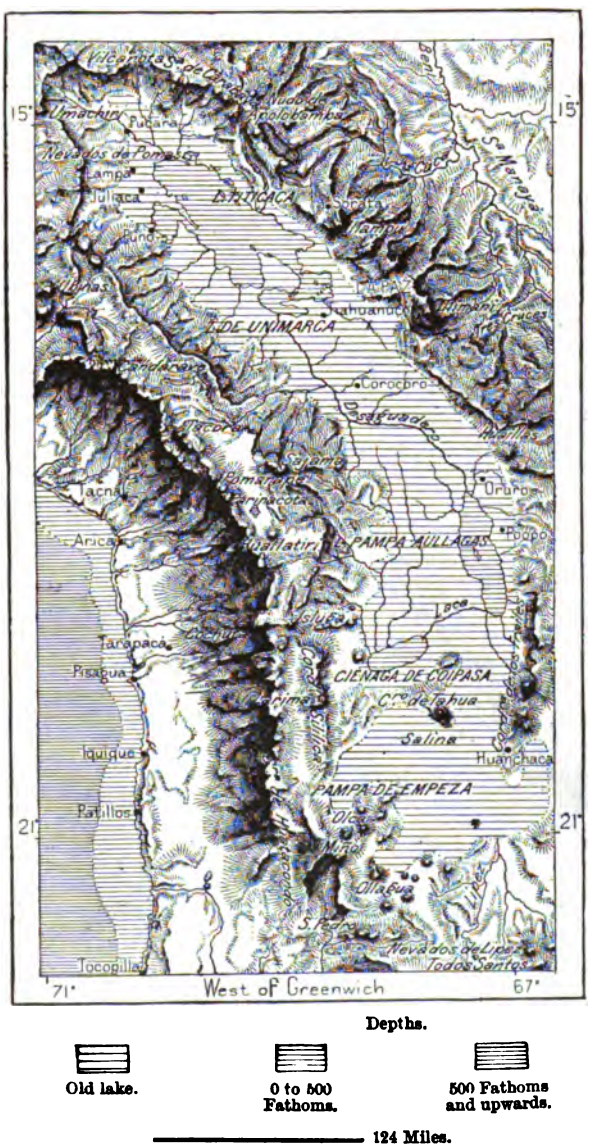
Titicaca, "Tin Stone," called also Lake of Puno, and formerly Lake of Chucuito from a Peruvian city on its west bank, is the largest fragment left by the ancient inland sea. From its north-west extremity near the Peruvian town of Lampa, to the south-easternmost Bolivian inlet near Tiahuanuco, it has a total length of 98 miles, with a mean breadth estimated at 36 miles. The southern

basin, separated from Titicaca proper by the Strait of Tiquina, takes the name of Unimarca or Guinimarca, that is, "Dried Lake," as Billinghurst explains the word. The two sections have a joint area of 3,300 square miles, with an extreme depth of 700 feet.

As the deepest abysses on the oceanic seaboard generally occur at the foot of the

Fig. 139.—Old Lake of the Bolivian Plateau.

Scale 1 : 7,000,000.



loftiest mountains, here also the greatest depths are dominated by the snowy peaks of Illampu. While the annual change of level due to evaporation and the rains amounts to about 4 feet, a slight absolute subsidence seems to have taken place,

even within the historic period. Thus five islets near Puno are now connected with the mainland, and the exposed surface is strewn with freshwater shells. The west coast which slopes very gently, is studded with lagoons and swamps traversed by causeways dating from pre-Columbian times. In fact, the lake is so shallow along the western margin that a further subsidence even of 10 feet would suffice to reduce its whole area by at least one-fifth.*

Viewed as a whole the lake would present the form of an elongated oval but for a chain of hills revealed by a line of emerged summits, and disposed in the direction of the main axis parallel with both shores. Thus have been upraised the southern peninsula of Tiahuanuco and neighbouring islands; the large promontory of Capocabana connected with the west coast by a narrow stem; the long island of Titicaca; a limestone and sandstone hill which has given its name to the lake; lastly, the island of Coati and other smaller lands which have become famous in Peruvian mythology. One of these islands is indicated in the national legends as the cradle of man and civilisation.

Although standing at a high altitude in the cold regions, Titicaca is fringed with an impenetrable forest of reeds covering all the low-lying tracts; it also supports a few animal organisms, amongst others fish of the *orestias* family, a few siluridæ (catfish), and eight species of *allorchestes*, a crustacean apparently of pelasgic origin.† Films of ice are formed around the margin, but Titicaca is never completely frozen, even in the hardest winters. It affords pasturage to animals at all seasons, in summer along the shores, in winter in the water itself, where they graze on a lacustrine vegetation growing down to a depth of 3 or 4 feet below the surface.

Amongst the numerous streams discharging into the lake is the Ramis, which is formed by various torrents descending from the Carabaya and Vilcanota heights, and which presents the aspect of a veritable river. The emissary at the south-eastern extremity of the lake, known simply as the *Desaguadero* or "effluent," also discharges a considerable volume deep enough to be navigated by river steamers. This emissary, flowing south-eastwards in a line with the axis of the plateau, is joined by the Rio de Maure, a large tributary descending from the Western Cordillera and ramifying at the confluence into several mouths.

The Desaguadero itself divides into a number of branches, which are obstructed by aquatic growths forming extensive thickets frequented by the Uros. These Indian fishers construct floating villages by means of reed rafts, above which are raised matted huts of these plants. In a course of about 200 miles the Desaguadero descends by a uniform incline a total height of 475 feet down to another lacustrine

* Comparative areas of Titicaca and other large lakes :—

	Square Miles.
Superior	33,200
Nyanza	30,000 ?
Michigan	24,700
Tanganyika	15,600
Baikal	14,000
Titicaca	3,300
Geneva	230

† Alexander Agassiz, *Ausland*, 1876, part xxxv.

LAKE TITICACA, AND RUINS OF THE TEMPLE OF THE VIRGINS, COATI ISLAND.

basin variously known as Pampa-Aullagas, Poopo, Oruro, from the towns on or near its banks. Into this land-locked lake the Desaguadero discharges a volume estimated at over 3,500 cubic feet per second.

Pampa-Aullagas, which is of a more regular oval form than Titicaca, appears to be much shallower; its survey, which, however, is far from complete, has nowhere revealed depths of more than 70 feet. Panza, an island in the middle of the basin, is disposed in the same direction as the general axis of the plateau. Besides the Desaguadero, the lake receives a few affluents from the Eastern Cordilleras. But the evaporation from a surface of about 1,100 square miles would appear to exceed the contributions from all these sources, for the effluent escaping south-westwards has apparently a mean discharge of scarcely 35 cubic feet per second.

This outlet even disappears for some distance in the sands, reappearing lower down under the Aymara name of Laca Ahuira, "Effluent," which is soon lost in the saline Coipasa marshes. Other rivulets also descend from the Western Cordillera towards this shallow depression, which is transformed to a temporary lake during the wet season. The Coipasa morass, standing at an altitude of 11,000 feet above the sea, occupies almost the lowest part of the Titicaca hydrographic depression. If, however, the surveys can be trusted, it would still be some 10 feet higher than another Bolivian basin, the extensive saline swamp of Empeza, which lies farther south, to the west of the Huanchaca mines. Owing to the argillaceous mud of their bed these marshy tracts are completely impassable during the rainy season; but in summer they offer a solid surface over 3 feet thick, formed by thin alternate layers of salt and clay.

The Beni and Madre de Dios.

At present the La Paz gorge, through which the inland sea formerly sent its overflow to the Amazons, gives rise only to the La Paz torrent, so named from the city on its banks. But before escaping from the mountains this rivulet is joined by larger streams, such as the Cotocayes, and the Altamachi, forming with them the Rio Beni, which winds away north and north-east to the Madeira affluent of the Amazons. Although comparable in volume to the most copious rivers of Europe, the majestic Rio Beni is, nevertheless, surpassed by the Mamoré, which rises, under the name of the Rio Grande, in the Bolivian Andes between the Cordillera Real and the Cochabamba ranges. After describing a vast semicircular bend round the north-eastern ramparts, the Mamoré is swollen by numerous affluents descending from the northern slope of the mountains, the southern waters of which it had already collected.

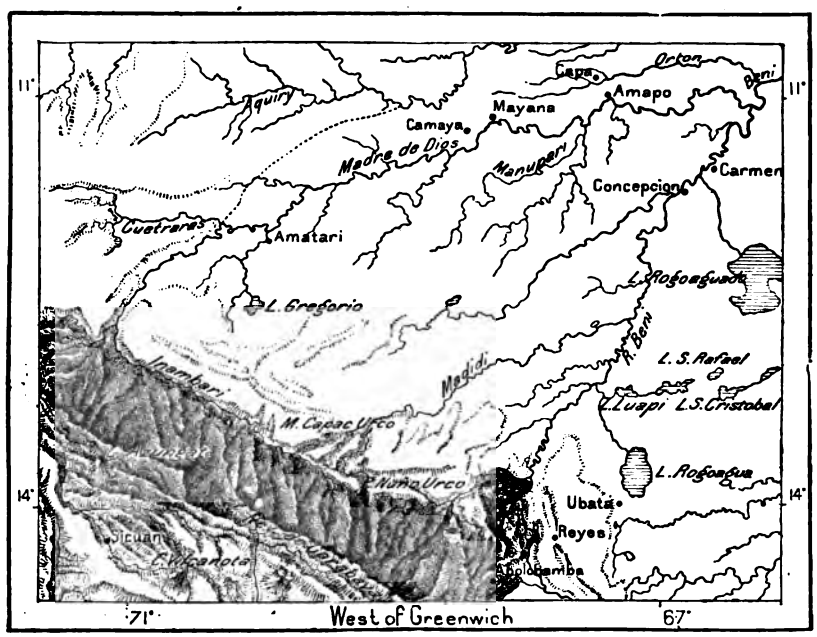
The Beni is also rivalled by the Madre de Dios, which has its source in Peru, but in its middle and lower course flows through Bolivian territory. According to the missionary Armentia, who navigated both rivers, the Madre de Dios is the larger of the two, thanks to its copious main branch, the Rio Inambari. Pent up in a rocky longitudinal valley at the foot of the Carabaya highlands, it receives

successive contributions of the torrents from all the surrounding upland valleys. Yet despite its great size, geographers were ignorant till the middle of the nineteenth century of the true course of the Madre de Dios, which also bears the local names of Mana, Mayu-Tata and Amaru-Mayo, or "Snake River."

About the beginning of the fifteenth century the Inca Yupanqui descended this river at the head of 10,000 men to reduce the wild tribes along its banks. He had to return after losing nine-tenths of his troops, but must have ascertained the true course of the stream beyond the point actually reached by the expedition. Thus is explained the fact that Garcilaso de la Vega, heir of the science of the Incas, was aware that the Madre de Dios joined the Beni. Yet the normal direc-

Fig. 140.—Basin of the Madre de Dios.

Scale 1 : 10,000,000.



..... Supposed course of the Madre de Dios before the late discoveries.

——— 186 Miles.

tion of its valley would seem to make such a confluence impossible, and most geographers long continued to regard the Madre de Dios as the chief branch of the Rio Purus, which flows directly to the Amazons.

The question was at last settled by Faustino Maldonado and his seven brave young associates, who committed themselves to the current of the Inambari on a frail raft. After overcoming difficulties of all kinds, especially on the part of the savage tribes roaming the riverine tracts, they entered the Madre de Dios, passing thence down the Beni to the Madeira, where Maldonado, with three of his comrades, perished in the rapids. The rest of the party succeeded in reaching Manaos, where they reported the discovery. Their report, however, was discredited till confirmed

in 1884 by Armentia, the explorer best acquainted with the forest regions of east Bolivia, who ascended the river up to Peruvian territory.

On the other hand, the Purus was also surveyed as far as the region of its headwaters, while the whole basin has been traversed in all directions by the collectors of rubber. Hence there can no longer be any doubt that the Inambari, flowing north-west parallel with the Carabaya Alps, effects a junction with the Beni winding to the north-east. At the confluence the Madre de Dios (lower Inambari), much the broader of the two, is 1,260 yards wide from bank to bank. Farther down the united stream is precipitated a vertical height of 30 feet.

The Pilcomayo.

South-east Bolivia sends its running waters through the Pilcomayo to the Paraguay. Rising in close proximity to the Guapay (Rio Grande), the Pilcomayo flows south-east, successively piercing several chains, and after its junction with the Pilaya, a river of equal volume, winds in a shallow bed through the plains of Gran Chaco. A few headstreams of the Bermejo have also their sources in Bolivian territory, while the upper Paraguay receives some small tributaries, of which the Otuquis is the most important, from the eastern savannas and the upland valleys of the Chiquito mountains. Lastly, in the broad space between the Mamoré and Pilcomayo affluents various watercourses of undecided incline run out in closed basins on the divide, leaving saline incrustations on their banks.

In this part of Bolivia, where the rainfall is deficient, the lakes or lagoons are due mainly to the small volume of the streams, which lack the strength to excavate deep and regular channels. In the north, on the contrary, that is, in the Beni and Mamoré basins, the analogous formations owe their origin to the superabundance of water which overflows into the lacustrine depressions skirting both sides of the rivers. The Rogoaguado, one of these basins of fluvial origin, between the Beni and the Mamoré, is reported to cover a space some thousand square miles in extent.

IV.

Climate.

In Bolivia the climate varies with the zones of the plateau, the Cordilleras, the upland regions sloping eastwards, the Yungas valleys and the eastern plains, while the zones themselves are further modified by latitude. Being comprised within the tropics, Bolivia would naturally be a land of extreme heat but for the great elevation of its plateaux and highlands, which give it the advantage of a superimposed series of climates, ranging from a torrid to an arctic temperature.

The districts in which the towns have been founded and where the populations are mostly concentrated, between the altitudes of 12,500 and 8,000 feet, have a mean temperature ranging from 54° to 61° Fahr. Here the south-east trade

winds prevail regularly during the fine season preceding the rains, and especially in July and August. With November begins the wet season, which lasts throughout the austral summer, or at least till the end of February. May, June and July are the cold months, though the change is less felt in the more equable climate of Lake Titicaca, thanks to the moderating influence of its waters. Hail falls usually at the beginning and the end of the wet season, and is much dreaded especially by the wine-growers in the south-eastern district of Cinti.

According to the Jesuit missionary, Bernabé Cobo, who lived in the middle of the seventeenth century, thunder prevails mostly in the region of the Andes about the sources of the Amazons and Plate River affluents. Here is situated the city of Chuquisaca, which is "every year struck several times by lightning." The Yungas district at the foot of the Andes, whose steep escarpments are exposed to the moisture-bearing clouds, receives copious downpours throughout the whole year. This abundance of humidity combined with the high temperature develops an exuberant growth of every product of the vegetable kingdom.*

Flora.

The marvellous richness of the flora of Bolivia is due to the fact that this is the central region of the South American continent, where are intermingled the Andean and Brazilian zones, as well as numerous forms characteristic of the Amazonian and Plate basins. Here also all the plants of the Old World are acclimatised with the greatest ease, provided care be taken to select districts with corresponding climates. Timber suitable for building purposes, cabinet and dye woods, fibrous and medicinal plants, all are found in superabundance, and the great variety of plant life explains the industry of the so-called itinerant "botanists," native quacks who traverse every part of South America, retailing all kinds of nostrums.

In the Yungas region there are woodlands even more dense and leafy than those of the Brazilian seaboard, and nowhere else do the lands under tillage yield more abundant or finer harvests. In the eastern zone, where the Andean flora disappears, replaced by that of Bolivia proper, forests and savannas, locally called *pajonales*, are diversely intermingled. But the clearings are gradually reduced in number and extent in the direction of the mountains, and at the foot of the cordillera the woods are continuous.

In the hot lands, palms are represented by numerous species, which supply the natives with food, drink, clothes, habitations and various implements. Some members of this family are even found penetrating into the temperate lands, and the variety known to botanists by the name of *euterpe andicola* grows on the steepest slopes of the Cochabamba range almost in immediate proximity to the line

* Mean temperature of some Bolivian towns :—

	Latitude.	Altitude	Temperature.
La Paz	16° 30′	11,950 feet	50° Fahr.
Cochabamba	17° 27′	8,400 ,,	68° ,,
Tipuani	15° 35′	1,900 ,,	73° ,,

of permanent snow. Like the tree-ferns, this palm lies on the verge of the zone of woody vegetation. Despite the great altitude of the plateau, the shores of Lake Titicaca have also some arborescent forms, such, amongst others, as the dwarf olive.

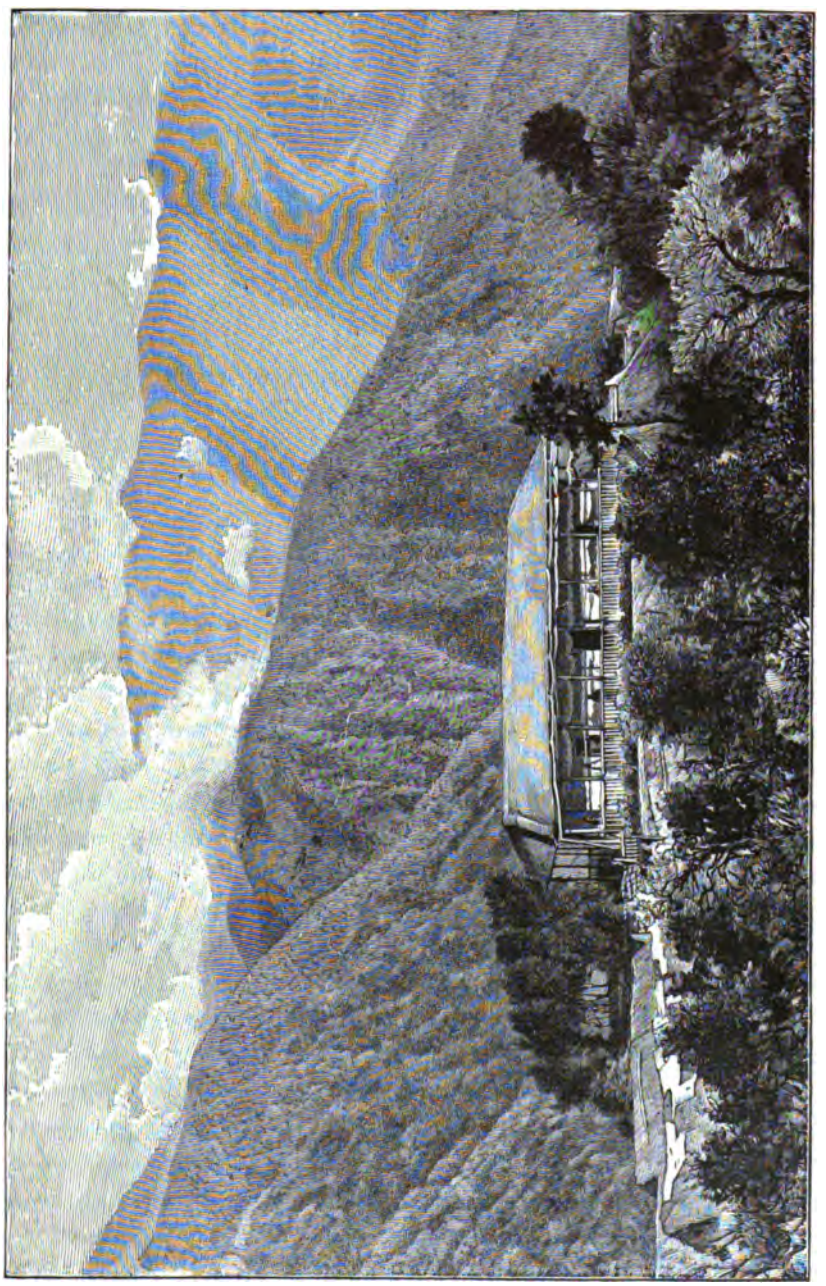


Fig. 141.—Yungas Scenery—Cussiliani Hacienda.

Above the zone of trees the prevailing form is the *llareta*, a plant with strong roots, and a dense foliage closely matted together like a yellowish lichen, and in appearance presenting a musty metallic surface.

Fauna.

The mammalian fauna of Bolivia differs little from that of Peru, except in respect of the greater or less relative abundance of the various species. In the region of the Yungas one of the animals most frequently met is the capybara, or cabiai as it is called in Brazil (*hydrochærus capybara*), a large rodent about three feet in length, which commits great devastations on the plantations along the river-banks. In general appearance it resembles a diminutive hippopotamus, but is allied to the guinea-pig family.

The country is also extremely rich in all the smaller forms of animal life, such as birds, butterflies and beetles. Humming-birds of exquisite form and colour are met on the very summits of the mountains; Hugo Reck saw some flitting about on the Cerro de Potosi, over 14,450 feet above sea-level.

V.

Inhabitants of Bolivia—The Aymaras.

The Aymaras, who constitute the chief ethnical element of the Bolivian nation, are in almost exclusive possession of the plateau regions, and their domain also encroaches northwards on Peruvian territory in the departments of Arequipa, Moquegua and Cuzco. In these northern districts they are conterminous with the Quichuas, while other Quichuas dwell in the neighbouring southern lands.

But the true centre of the Aymara race lies in the islands, headlands and shores of Lake Titicaca, where from remote times were grouped the Aymaras proper, whose national name was afterwards extended to all the populations of like speech. At the same time, this focus of primitive Aymara culture was a "holy land" for the Incas themselves, whose national legends pointed to the Titicaca region as the land whence came the civilisers of the Quichua nation.

From these and many other indications, it may be inferred that the Incas were themselves of Aymara origin or, at least, had adopted Aymara culture, and perhaps Aymara was even the court language of the Inca dynasty. While all other people conquered by the Quichuas were compelled to learn the language of their masters, the Aymaras alone were privileged to continue the use of their mother-tongue.

But at the epoch when the Spaniards penetrated into the country the Aymaras, having long been subdued, had already entered a period of decline, and were a less polished people than the Quichuas. They had lost all memory of their ancient culture, and, being no longer capable of raising monuments comparable to those that their ancestors had erected in the Tiahuanuco peninsula, they attributed these remains to a race of unknown builders, who were supposed to work in the dark, ceasing at sunbreak.

After the arrival of the whites the Aymaras continued to decline so steadily that fears were entertained of their total extinction. To judge from the innumerable remains of buildings and from the extensive burial-places in the vicinity of Lake Titicaca, this basin, now so sparsely inhabited, must have formerly been a thickly peopled region. But on this open plateau the inhabitants had no places of refuge; none could escape the "mining conscription" compelling them to join the doomed gangs of workmen in the metalliferous galleries of Potosi, Oruro and other places. The destruction of the race thus proceeded in a systematic and, so to say, legalised manner.

Then, at the time of Tupac Amaru's insurrection, those who still survived eagerly joined the revolt, in the hope, if not of recovering their independence, at least of bringing about a change of masters. The ensuing war, massacres, famine and epidemics reduced the whole nation to a few wretched fragments. But with the War of Independence a revival took place, and at present the Aymara nation may be estimated at about 1,000,000, including in this expression all those who have already become more or less Hispanified. It appears, however, that in the case of unions with the whites the type of the Aymara mother is more persistent than that of the Spanish father. After several successive generations of such interminglings, the true Aymara always reappears under the disguise of the national name, "Hispano-American."

Although Christianity with its Spanish formulas has become the universal cult, numerous ceremonies of national origin are still associated with the new religion. Neither peasant nor pastor will drink a glass of brandy without raising his hat and making a libation of a few drops to the spirits of the mountain. In many habitations the fossil remains of the huge pre-historic animals—mastodons, megatheriums, glyptodons—are set up as household gods.

Like the Semites of former ages, all the present Indian inhabitants of the Sierra still preserve the worship of the "high places." Every mountain-top terminates in a large cairn or heap of stones, raised by the hands of passing wayfarers. Formerly, all packmen climbing a steep slope were required, on reaching the summit, to offer to the god Pachacamac a thanksgiving offering of the first object their eyes lighted upon, and as this was usually a stone, the heap gradually rose higher and higher. At the same time they repeatedly uttered an invocation, of which the burden was the word *Apachecta*. Thus it happens that this term—under its Spanish form, *apacheta*—is now universally applied both to the cairns themselves and to the heights on which they stand. On the elevated plateaux of the Puna district the shepherds fancy that on Good Friday they can commit all imaginable crimes, except murder, without any fear of punishment, because God having died on that day and remained dead the two following days, He knows nothing of what has happened when He does rise.*

Like Quichua, the Aymara language is still generally current, and has even invaded the towns. In La Paz, metropolis of Bolivia, the Spaniards, being nearly all brought up by native nurses, and surrounded by native servants, speak the

* David Forbes, *Journal of the Ethnological Society*, vol. ii.

native tongue fluently. It greatly resembles Quichua, both in structure and vocabulary, and about twenty per cent. of the words of both languages, especially such as have reference to religious ideas and worship, are either identical or closely related. But of the two, Aymara is the more difficult to pronounce, owing to its guttural and palatal sounds. Hence very few of the recent European settlers face the labour of acquiring it, all the less that they everywhere find either full-blood or half-caste Aymaras acquainted with Spanish.

As regards their moral qualities, the Bolivian Indians are even more sullen and depressed than those of Peru; their very features seem contracted by the lines of "a vague but ever-present sense of suffering." Made shy and suspicious by generations of ill-treatment, they observe and take note of everything without moving the head or a muscle of the countenance.

In their physical appearance the Aymaras also betray a marked affinity with the Quichuas, although alliances between the two peoples are of rare occurrence. Both are alike short and thickset, with the same reddish complexions, the same broad face and black eyes, the same slightly rounded forehead and globular cranium. The head is distinguished by the prominence of the parietal bosses, giving it a somewhat pentagonal form; hence no Aymara woman can ever be called even comely, at least from the European point of view. The skulls of men that have been found in the graves had nearly all been artificially deformed, although the deformation of children's heads appears to be no longer practised.

Like their persons, the ordinary costume of the Aymaras is singularly unbecoming. Wealth is measured by the enormous size of the *monteras*, or hats, expanding in the form of a corolla with broad opening above, from which are protruded bunches of flowers and feathers on gala-days. The women have their hair nearly always plaited; they bend under the burden of heaped-up skirts; in some districts it was formerly the fashion to add a petticoat every year, those of previous years being retained till they fell to pieces.

The Chiquitos.

The Bolivian Quichuas, who differ little from those of Peru, complement the section of the nation which is gradually intermingling with the population of Spanish origin. But the other Indians, dwelling to the north-east and east in the valleys of the foothills and on the plains, show few traces of miscegenation, most of them having hitherto kept aloof, while preserving their tribal independence. The statement, however, does not apply either to the Chiquitos, who occupy the crystalline heights on the water-parting between the Rios Mamoré and Paraguay, or to the Mojos, living farther north in the low-lying and frequently inundated spaces traversed by the Machupa, San Miguel, Rio Blanco and Baures affluents or sub-affluents of the Guaporé. These two groups of tribes bear Spanish or, at least, Hispanified names, which attest the friendly relations that have been maintained between them and the conquerors.

The Chiquitos, a Spanish word meaning "Little Folks," are so called in reference, not to the people themselves, but to the form of their huts, the entrance to which was made so low, in order, as was said, to keep out flies and mosquitos, that they could be entered only on all fours. Without, however, being actually "little folks," the Chiquitos are still somewhat shorter than the Indians of Gran Chaco, discovered at an early date by the Europeans who first ascended the Paraguay river.

The men measured by D'Orbigny had an average height of 4 feet 10 inches, and in other respects they differed in appearance somewhat from the southern natives comprised by this anthropologist under the general name of Pampas Indians. They have robust frames, broad shoulders, a strong but not prominent muscular system. The shapeless body seems "all of a piece," even amongst the women, whose girdle scarcely does more than suggest a waist, and whose solid figures betray a strength scarcely inferior to that of the men.

The Chiquito has a round head and full face, in which the projection of the cheekbones disappears in the massiveness of the jaws. A smile generally plays about the corners of the small mouth, giving to the whole physiognomy a pleasing expression of benevolent kindliness. The moral character of the Chiquitos fully corresponds with their physical traits. They are always cheerful, preserving a naturally kind disposition despite the cruel treatment to which they have been so frequently subjected. Being extremely sociable and hospitable, they are constantly paying a round of visits from tribe to tribe, and never fail to give the stranger a friendly welcome. In their enjoyment of life they thus present a striking contrast to their neighbours dwelling on the southern Pampas.

Disputes are rare, even in the domestic circle, for the Chiquito is by no means of a jealous nature, while the wife is all the more faithful. With his quick intelligence, he readily masters all crafts, and plies them with ease; under the direction of the missionaries the village people willingly applied themselves to the work required of them. Born musicians, they greet the rising sun with the flute, and then set about the day's work, which is over about noon, the afternoon and evening being given up to the chase, singing, dancing and recreation. One of their great amusements is the game of tennis, in which hundreds take part, using their heads as rackets to catch and drive back the ball.

The happy disposition of this light-hearted people corresponds with the delightful country which they inhabit, a land of low hills and heights, of pleasant valleys and open woodlands easily traversed. Those engaged in husbandry were wont to set apart a patch of well-sheltered and fertile land for each tribal community, while the hunting tribes kept a broad forest preserve round their dwellings. The whole race was thus divided into numerous isolated groups, the more distant of whom had but a nominal acquaintance with each other.

All the inhabitants of a village had often but one house in common, a sort of communistic abode, as if the group formed a single large family. But after the age of fifteen the young people lived apart, also under one roof, where was passed their novitiate before marriage, which concluded with an offering of game. But these

social and rural usages did not prevent the Chiquitos from occasionally engaging in wars; which, however, were soon over. The temporary chiefs chosen for such emergencies merely retained an empty title, without any personal authority maintained by force. The Chiquito warriors even made captives, who received the name of slaves, but who none the less married into their master's families.

Before the arrival of the Spaniards the Chiquitos were certainly a numerous nation. But then came the first conqueror, Alvarez, Cabeza de Vaca, "Cow-Head," who, after his long and marvellous adventures in unknown lands and amongst barbarous tribes, undertaken in quest of Mexico, arrived at the head of armed bands on the banks of the Paraguay, and set to butchering the natives, as if to indemnify himself for his previous sufferings.

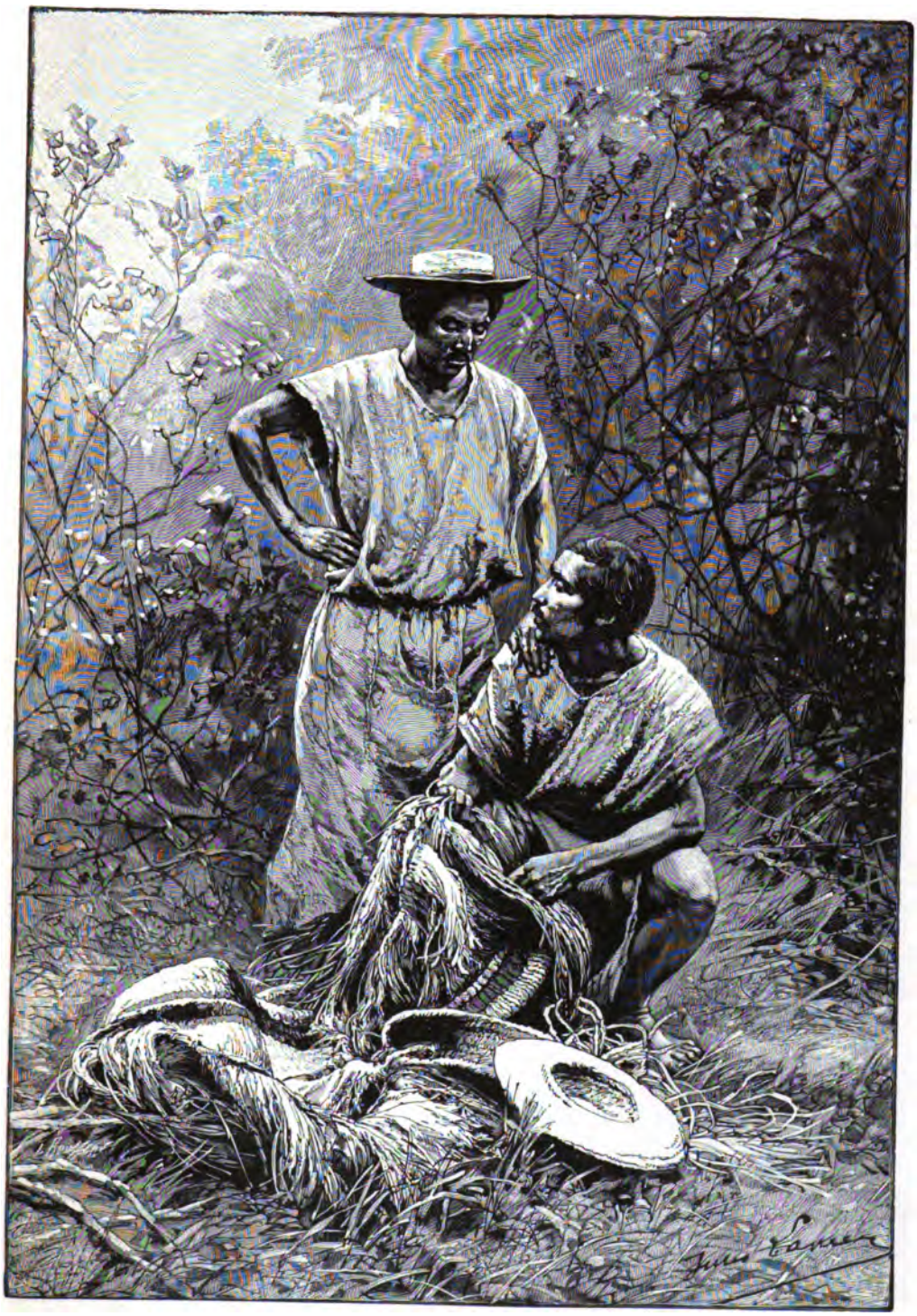
In the seventeenth century the so-called "Mamelucos" of the province of São Paulo raided the country in search of slaves, and they found imitators in the Spanish traders of Santa Cruz de la Sierra. Then the Jesuit missionaries, in their eagerness to save the remnants of numerous broken tribes, unwittingly brought them death in the form of small-pox and other contagious maladies. Nevertheless, the race has survived, and every year not marked by the visitation of some epidemic scourge the population has even increased, for the Chiquito women are most prolific. According to the statistical report prepared by D'Orbigny in 1831, they numbered nearly 20,000 at that time, without reckoning the kindred tribes dwelling in Brazil on the opposite side of the Paraguay.

Of this number the Chiquitos, properly so called, represented about 15,000, all converted to the Catholic religion. Nearly all, even those who had a distinct mother-tongue, spoke the soft and melodious Chiquito language, which was methodically taught by the Jesuits amongst all the surrounding tribes. It was, however, supplemented by Spanish for all purposes connected with public worship, the industries and calculation, for the Chiquito arithmetic got no farther than the number ten. Some of the old heathen practices still survive under the outward form of Christianity, although those Indians who, after the departure of the Jesuits, reverted to the wild state have not revived their former primitive usages. Thus, while discarding the European clothes, they no longer paint their bodies, or perforate certain parts of the face, as did their pagan forefathers.

The Mojos.

Dwelling in a land of hills, glens and brooks, the Chiquitos have no knowledge of navigation. The Mojos, on the contrary, who have their camping-grounds along the banks of large rivers or on frequently-flooded plains, are all skilful boatmen. Nevertheless, they depend for their sustenance chiefly on agriculture. The periodical floods occur at regular seasons, leaving the crops full time to ripen between sowing and harvest tides.

Physically the Mojos closely resemble the Chiquitos; but they are more robust, and rather taller, while the women have somewhat less massive figures. Without possessing the overflowing spirits of their neighbours, they are dis-



MOJOS INDIANS.

tinguished by a remarkably equable disposition, a frank and upright character and great industry. They give up less time to merrymaking than their southern kinsfolk, and are generally of more laborious habits. Hence their industries are greatly developed, and although living far from the large towns and markets, the Mojos excel all the other Indians as weavers, builders and wood-carvers. They even probably surpass the Chinese themselves, as well as all other people, in the surprising skill with which they can work on given models; but they lack the inventive faculty, as is so often the case with good imitators.

According to Viedma, an explorer quoted by D'Orbigny and by most other writers on Bolivia, the Mojos were acquainted with a sort of writing system, which consisted of strokes drawn on tablets. Their language is at once more guttural and far less rich than that of the Chiquitos. Some of their tribes not engaged in commercial pursuits were even unable to reckon above five, some stopping at three or four.

All the Mojos dwelling within the Bolivian frontiers number collectively about 30,000 ; this figure should be perhaps doubled to include the kindred tribes living in Brazil and the northern forests nominally belonging to Bolivia. Formerly they were far more numerous; but, like so many other nations, they were reduced more by the epidemics following in the wake of the missionaries than by wars and massacres, from which they were always protected by their swampy domain, lying beyond the routes generally taken by the gold-hunters, slave-dealers and other adventurers.

They accepted the administration of the Jesuit priests with perfect submission, and on no occasion ever attempted to shake off the yoke. Their own primitive religion was complicated by some atrocious superstitions. Thus, women suffering a miscarriage were doomed to death, and the sacrifice had to be made by their husbands. When twins were born they also were destroyed, on the ground that such births showed them to be mere animals. Occasionally on the death of the mother the new-born babe was buried alive with her.

Their religion was pure nature-worship. They believed they had themselves sprung from the lakes, the woods or the river-banks, and when navigating the streams they were always seeking to return to their birth-place. Every village, every family had its gods in the air or under the ground, or amongst the living creatures inhabiting the streams and forests.

At present most of the Mojos are zealous or even fanatical Roman Catholics; during Holy Week they scourge themselves or otherwise mortify the flesh, sprinkling their blood on the steps of shrines and altars. The influence of the Catholic system appears to have completely modified their political status. Formerly the caciques had no authority, whereas now, as agents of the priests, they exercise absolute power. Their least word is a command, and "the rod has not been given them in vain." But to priestly influence has succeeded that of the traders, especially since the fruitless works undertaken to turn the rapids of the Madeira by means of a railway.

The Mojos are found so useful as boatmen that efforts have naturally been

made by the whites to secure their services, with the result that many of their separate communities have been broken up, while their customs have generally undergone a rapid change. The Mojos boatmen, seen at all riverine ports of the Beni, the Madeira and the Amazons as far as Manaos, are the admiration of all travellers. They are clothed in a comfortable smock, made by themselves from the bark of some forest giant. In a few hours a tree suitable for the purpose is felled, and a strip of the bast or under-bark about 12 or 14 feet long is detached. This substance, which shines like silk, is then made pliable by pounding with mallets, after which the best and most elegant of ponchos is made by merely effecting an opening for the head.

The Canichanas and Guarayos.

D'Orbigny classes with the Mojos other tribes resembling them in various physical traits, and perhaps of the same origin, although differing greatly from them at present. Such are the Canichanas, who have the reputation of being cannibals, and who in any case are still fierce marauders, often lurking behind the trees to waylay passing whites. Unless they keep a sharp look-out travellers are in a moment deprived of their arms and of all iron implements in their possession.

The Canichanas speak a language quite distinct from that of the Mojos, as do also the Itonamas, another tribe also much dreaded for their treacherous ways and thievish propensities. They have not yet abandoned the horrible practice of smothering the sick to prevent death from escaping and passing into other bodies. The Ité, or Itenes, another people, who have given their name to the river also called the Rio Guaporé, have persisted in their hostile attitude towards the whites, traders and missionaries. They are often called Guarayos, a name wrongly applied to several different tribes, as are such designations as Arawaks and Guaycurus in other parts of South America.

The true Guarayos, who occupy the heights of the Amazonian water-parting, belong undoubtedly to the great Guarani family, which is dominant in Paraguay, in the Argentine province of Corrientes and the conterminous regions of Brazil. They are a small tribe (estimated by D'Orbigny at not more than 1,100 souls), who, according to their traditions, came originally from the south-east. But the migration must have taken place in pre-Columbian times, for the first pioneers found them in the same district which they still occupy, between the Chiquitos and the Mojos. The vast territory over which their little hamlets and camping-grounds are thinly scattered resembles the lands inhabited by the Chiquitos—the same low hills and fertile glens, the same patches of woodlands, the same picturesque and sunny landscapes.

The Guarayos, that is, Guara-Yù, or "Yellow Men," have really an extremely light complexion, so that were they transported to Europe they would easily be confounded with the rest of the population. Although akin to the Guarani of Paraguay, the Guarayos are of taller stature. With their robust and, at the

same time, graceful figures, they present a fine type of manhood. The face is round, with mild bright eyes slightly oblique at the outer angle; but they are specially distinguished from the other Guarani and, in fact, from all American aborigines by a long, full and straight beard, never frizzly like those of Europeans, covering the chin, the lower part of the cheeks and upper lip. According to D'Orbigny, this remarkable physiological anomaly of the Guarayos must be attributed to some unexplained influence of the environment.

Their character reflects their physical constitution, offering, in the language of the same scientific observer, "a type of the good nature, courtesy, frankness, honesty, hospitality and proud bearing of the free man." The Guarayo holds himself superior to the European, and it cannot be denied that in the exercise of freedom and uprightness he compares favourably with most of the civilised peoples with whom he comes in contact. He recognises no master, but shows great respect for old age, and readily hearkens to the counsel of the elders.

The Guarayo penal code, which, however, seldom needs practical application, is of a summary character, being resumed in the sentence of death for all cases of theft and infidelity. The young women are not required to account for their conduct; but once sold, not by the father but by the brother, such being the marriage law, they belong to their husband, who may give them a companion in their old age.

Their habitations take the form of roomy octagonal huts, resembling those of the Carib natives of Haiti at the time of the Conquest. They also make dug-outs somewhat like our light paddle canoes, some of which are over 30 feet long and nearly 2 feet wide. Their religion, like that of certain mediæval sectaries, requires them to disregard clothing, so that they go naked except in the vicinity of European settlements, where they don a bast smock, such as that worn by the Mojos boatmen. But they paint the body in motley red and black colours, and as distinctive tribal marks wear garters, plumes, a little rod passed through the cartilage of the nose, besides various tattoo markings; the hair is allowed to grow to its full length, never under any circumstances being cut.

They worship Tamoi, that is, "Grand-Father," a great spirit who taught them husbandry, and ascended to heaven, promising to take them thither after death. The sacred tree, planted at the side of every cabin, is intended to serve as a perch from which the soul flits upwards when released from the body. In memory of Tamoi's ascension, and in hope of their own, they celebrate certain solemn feasts, armed with a bamboo cane, with which they beat the ground in unison with their songs and prayers.

The Chiriguanos, Tobas and Sirionos.

Akin to the Guarayos are the Chiriguanos or Chirihuanas, who are much farther removed from the body of the Guarani race, dwelling at the foot of the Bolivian Andes, and along the banks of the Caca or Rio Grande as far as the great forest zone. But their language, although differing little from that current

in Paraguay, is nevertheless more distinct than the Guarayo from the primitive stock.

A part of the nation, settled by the missionaries in large villages, has accepted Christianity, and these are said to be rapidly increasing in the province of Tarija. But most of the Chiriguanos have preserved their independence, and these wild tribes are estimated by D'Orbigny to number altogether 19,000. Being of industrious habits, they eagerly seek employment in various occupations beyond the field operations and other pursuits necessary for their support. Of the numerous peoples mentioned as practising the couvade, none would appear to have till recently observed this strange custom more strictly than the Chiriguanos.

Their councils of war, compared with those of other peoples, presented some original features. They sought inspiration first in music and dancing; then, after deliberating the whole night long, they bathed at dawn, painted their faces, decked themselves in plumes, fasted, and put the final decision to the vote. Both Christians and pagans seem singularly indifferent to religious matters; but, like practical men, they readily accept whatever comforts may be derived from European culture.

The Tobas, a people of the Pilcomayo basin, conterminous with the Chiriguanos, have often attempted to seize some of their Bolivian valleys; they also occasionally undertake marauding expeditions, plundering and murdering the surrounding populations. They are much dreaded, and at Bolivian feasts the figures of Tobas, adorned with ostrich feathers, are always introduced to represent typical "savages." It was while attempting to traverse the Tobas territory, in order to reach Bolivia by the direct route of the Pilcomayo, that the French explorer Crevaux and his companions met their death.

The Sirionos, another Guarani people now settled in Bolivia, appear to number, according to D'Orbigny's estimate, not more than 1,000 souls. Holding the whites and half-castes in abhorrence, they dwell north of the Chiriguanos, and not far from the Guarayos, in the forests through which winds the Rio Grande. The immigration into this district certainly dates from a very remote epoch, for their Guarani speech has become so corrupted that they have great difficulty in understanding their Chiriguano neighbours. Despite their long sojourn in a region abounding in navigable waters, they have not yet learnt to build boats; hence when they have to cross the streams they skilfully suspend lianas from bank to bank, availing themselves of snags or other convenient supports lying athwart the current.

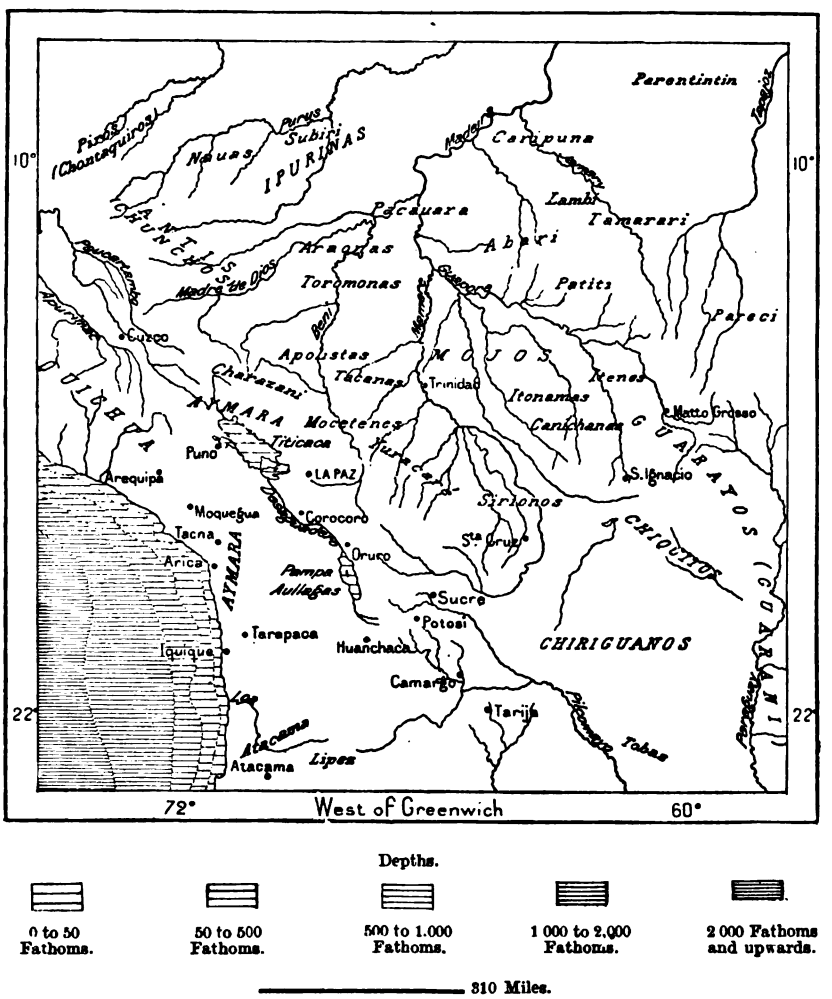
The Antisians.

West of the Rio Mamoré, and north of the Cochabamba and Carabaya Andes, the Indians of North Bolivia who roam the region of plains and foothills are designated in a general way as Antisians, a collective name which embraces several groups differing greatly from each other in many respects. The civilised people of the plateaux usually call them Chunchos, a word which, as used by them, has simply the meaning of "Savages."

Occasionally this term Chuncho is applied in a special way to those Mosetenes who have remained pagans, who dwell on the banks of the Beni, and who are thus distinguished from the Christian Mosetenes and Lecos. The absolutely incorrect name Guarayos is applied in a still more hostile sense to the Indians who roam the dense forests between the Rios Madre de Dios and Madidi. In this region

Fig. 142.—Aboriginal Populations of Bolivia.

Scale 1 : 18,000,000.



Guarayos has acquired the sense of "enemy," and from it is even derived a verb meaning "to kill."

The whites have little knowledge of these pretended Guarayos, who differ so greatly from the true Guarayos of Guarani origin. They, in fact, give a wide berth to these wild forest tribes, who go nearly naked, except on feast-days, when they strut about arrayed in flowing mantles. Daring boatmen, they use fire to hollow out canoes, 50 feet long, formed of a single trunk, and also make swords

or cutlasses of the hard wood of the *bactris ciliata;* but they leave all agricultural work to the women.

These Guarayos, however, are a religious people, who worship Baba-Buada, a deity identified with the wind, who dwells in the southern regions whence blow the trade winds. Before sowing time, as well as during the harvests, they celebrate great feasts in his honour, and on these occasions also drink a liquor extracted from the manioc, but not to excess.

Neighbours of the Mosetenes are the Christian Lecos of the Maipiri basin, who appear to belong to the same ethnical stock. They present a striking contrast to the gloomy Aymaras in their cheerful, gentle disposition and childlike frankness. Although possessing an extremely melodious language, they never sing, possibly because forbidden this indulgence by the missionaries. Nor do they ever dance, and under the stern rule of the priests the slightest fault is punished with the lash; an "arroba," that is, five-and-twenty strokes, is quite a common punishment.*

Of all these Antisians or Chunchos the most remarkable group is that of the Yuracarés, or "White Men," a people of tall stature and fine presence, who are met chiefly between the headwaters of the Beni and Mamoré on the northern slope of the Cochabamba Andes. The Yuracarés are nearly white, and this complexion, combined with their proud bearing and graceful slim figures, might at a distance cause them to be mistaken for Europeans. The features, however, are, like those of the Quichuas, very distinctly Indian. D'Orbigny asks whether the light colour of the Yuracarés may not be attributed to the tepid moisture of the gloomy, sunless forests in which they pass their lives.

Their customs differ greatly from those of the Guarani, who are husbandmen seldom indulging in the chase except as a relaxation, whereas the Yuracarés live exclusively by the hunt, usually leaving the care of their garden plots to the women. As craftsmen they display great skill in weaving their garments and covering them with patterns stamped by means of carved wooden blocks. It therefore appears that these barbarians are acquainted with the printing process, of which the cultured Quichuas were absolutely ignorant.

Calling themselves the "First of Men," the Yuracarés try to show their superiority over other mortals by their contempt of physical pain. At the feasts they cover themselves with wounds without ever uttering a cry, and smear themselves with their own blood. They have also their "code of honour" to regulate their duels, vehemently discussing the various points at the public gatherings. When honour requires it they die, despatching themselves with the magnanimous simplicity of a Japanese, or the dignity of a Roman philosopher. Their strong imaginative faculty has evolved a rich national mythology, in which, however, the supernatural is left a moot question; the terror of the unknown beyond this life forms no part of their religious system.

A fundamental principle of education forbids them ever to reproach or offer the least advice to their children, who are left to guide themselves as they please on the example of their elders. But though their freedom is respected, their lives

* *Bulletin de la Société d'Anthropologie*, 1861.

are held in small account, and if troublesome they are quickly got rid of. Similar customs prevail amongst the Caripunas, the Araonas, Pacauaras, Toromanas and other tribes of the wooded plains watered by the Beni and Madre de Dios.

The Apolistas.

Various Indian groups occupying the foothills and plains of Apolobamba bear the general name of Apolistas. One of these, the Collahuayas, called also Muñecas, from the name of their province, and Charazani from one of their villages, dwell on the elevated uplands in the midst of the Aymaras, from whom, however, they keep aloof apparently indifferent to all passing events. Outwardly Catholics, and round their necks wearing a massive silver crucifix as a distinctive mark, the Collahuayas never marry outside the tribe, and speak a distinct language. More active and of lighter complexion than the Quichuas and Aymaras, they have also more delicate features, softer and more abundant hair, which they do up in a thick plaited knot.

Taciturn, patient and cunning, eager for gain and miserly, they think only of hoarding the family wealth. Like certain highlanders of the Balkan peninsula, the Alps and Pyrenees, they roam abroad as itinerant dealers in nostrums, magnets, metal objects, strolling minstrels and occasionally as doctors. In these capacities they traverse Bolivia, Lower Peru, even Brazil and the Argentine States, where they are simply known as *Indios del Peru*, "Peruvian Indians." After many years of this wandering life they bring back to their families the earnings thus laboriously acquired, at times returning with convoys of mules laden with their amassed wealth.

VI.

Topography of Bolivia—Tiahuanaco.

At present Bolivia has no large towns, though it is possible that large centres of population may have formerly existed in this region. The now obscure village of *Tiahuanaco* on the dry margin of Lake Titicaca, and 118 feet above the present water-level, was at one time, if not a great city, at least a political and religious metropolis. The ruins of a temple crown an eminence which was long believed to be artificial, but which Stübel shows is a natural hill. Sculptured granite and porphyry blocks lie strewn over the ground, some looking as if still waiting to be placed in position by the builders, and there are many other indications to show that the great works here projected were never entirely completed, having doubtless been interrupted by the Quichua conquest of Aymaraland, about 120 or 130 years before the arrival of the Spaniards. Rows of huge megaliths are still standing, which either mark the line of ancient streets, or more probably formed part of a vast cyclopean structure of the Stonehenge type.

The churches of all the native villages have been to a large extent built of materials taken from the scattered remains of the old Aymara city, and even the cathedral of La Paz has been brought, so to say, block by block, from this vast quarry. The only tolerably well preserved monument of Tiahuanaco consists of a sort of pylon, the so-called "Gateway of the Sun," a title suggested by a remarkable central figure carved in intaglio and surrounded by undeciphered signs or symbolic sculptures. On this astounding monument, which consists of a single block weighing about 150 tons, are seen images of owls, snakes and other ornaments, bearing a certain resemblance, even in the details, to the carvings of Palenque and Ococingo, and certainly belonging to a cult distinct from, and anterior to, that of the Incas. Some of the statues have been preserved and set up outside the modern church. A colossal head forming the capital of a column is also still seen half-way between Tiahuanaco and La Paz; this was probably part of an enormous human figure, which had to be abandoned after all efforts had failed to transport it to the Spanish city. The local Indians consider this curious block as a diabolical object, and when passing throw a handful of dust or mud in its face. in order to conjure its evil eye.

The origin of these remains has been much discussed; but Stübel, who has most carefully examined them on the spot, and continued their study in Europe jointly with Herr Uhle, argues convincingly that they can be assigned neither to the Toltecs of North and Central America, nor to the Incas, by whom they were more probably destroyed than erected, but must be attributed to the Aymaras themselves, whose culture, if ruder, is also more primitive than that of the Quichuas. This culture was characterised especially by megalithic structures, which are more numerous in their domain than elsewhere in America. In pre-Inca times Tiahuanaco itself appears to have been one of the two distinct religious centres of Peru (using the word in its broadest sense), the other being Paccaritambo, some 16 or 18 miles from the Inca capital, Cuzco.

Tiahuanaco was specially dedicated to the worship of Viracocha, tutelar deity of the Aymaras, while Paccaritambo was the seat of the Quichua sun-worshippers. But when the sway of the Incas was spread over the whole of the middle Andean plateau (Peru and Bolivia), there was no longer room for two rival religious centres; and the political subjection of the Aymaras to the Quichuas was followed by the inevitable suppression of the Viracocha cult at Tiahuanaco by the Incas, shortly before the suppression of the Incas themselves by the Conquistadores. Such appear briefly to have been the politico-religious relations of the two great Peruvian nations (Quichuas and Aymaras) in pre-Columbian times, though these relations have been strangely obscured by Garcilaso de la Vega, who, because of his Inca descent, has been blindly followed by nearly all writers on Peruvian subjects down to the appearance of Stübel and Uhle's great work.*

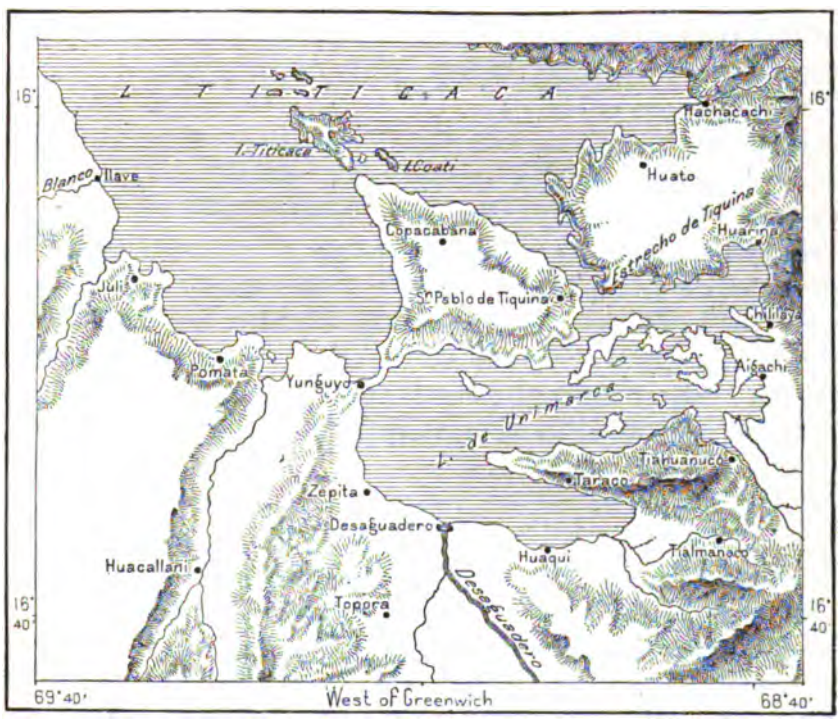
* This work, *Die Ruinenstaette von Tiahuanaco im Hochlande des Alten Peru*, &c., von A. Stübel und M. Uhle, Breslau, 1893, appeared too late to be consulted by M. Reclus, who is consequently not responsible for the treatment of the Tiahuanaco ruins and associated questions in the English edition.—Ed.

Copacabana—Corocoro.

The Copacabana peninsula, north of Tiahuanaco, appears to have also been a sacred spot during the primitive period of Aymara civilisation, and its hallowed associations have been preserved in the memory of the natives down to the present day. The local church contains a *Virgencita milagrosisima*, "a most miraculous little Madonna," to which flock eager votaries, the sick and infirm, those in trouble, and especially gold-seekers praying for some indications to guide them to the rich lodes and placers. This word *Copacabana*, which is met as far

Fig. 143.—Copacabana Peninsula.

Scale 1 : 1,000,000.



north as Colombia, is not due to the old Quichua conquests, but to the widespread fame of the Titicaca Virgin.

The chief antiquities of the peninsula consist of flights of steps, terraces and seats carved in the live rock. The thermal waters known as the "Incas' Baths" have been well preserved, with their three griffons and fish-tank. But on the neighbouring islet of *Titicaca*, or of the Sun, nothing now remains except tracks worn in the rock by the steps of pilgrims, and some fragments of walls and other shapeless ruins, nowhere presenting the imposing aspect of the cyclopic Tiahuanaco structures. Here also a thermal spring still feeds other "Incas'

baths," and in the vicinity is seen a grotto where, according to the national legend, Manco Capac dwelt before he issued forth to give laws to the Quichua world. On the little island of *Coati*, or the *Moon*, close to the east side of the Sun, stands the Palace of the Vestals, best preserved of all Aymara monuments.

Corocoro, which lies in a deep gorge of a little eastern affluent of the Desaguadero, dominated by bare rocks, owes its prosperity to the deposits of native copper contained in the neighbouring mountains. The metal occurs either in granulated form disseminated in the rock, or in crystals, cakes or nodules, and numerous veins are also argentiferous. The mining operations are carried on by means of galleries terminating in lateral pits communicating with tramways. The ores are extremely rich, but at this great altitude above arborescent vegetation the only available fuel is the resinous baccharis shrub, which yields insufficient heat for smelting purposes; hence the ores are simply crushed and levigated to get rid of all impurities. The powder obtained by this grinding process is exported to Europe under the name of *barrilla*.

Due west of the mines is the village of *Calacoto*, riverine port of Corocoro on the Desaguadero, which is here spanned by a reed bridge occasionally swept away by the floods. Formerly Calacoto, which stands above the Maure affluent, was passed by the most important route in Bolivia, the great commercial highway connecting the elevated plateaux with the Pacific seaport of Arica over the Tacora pass and by the city of Tacna. But the stream of traffic along this route has been partly displaced by the new railway running from Arequipa to Puno on Lake Titicaca. The road from La Paz to Tacna passes higher up by *Nazacara*, where is the terminus of the steamers descending the Desaguadero from the lake.

Oruro—Huanchaca.

Oruro, formerly *San Felipe de Austria*, stands at an elevation of about 11,700 feet on the saline plain stretching from the Desaguadero eastwards in the direction of the slopes of the Cordillera Real. Next to Potosi this was at one time the largest city in Bolivia, and in the seventeenth century was said to have a population of 76,000, ten times more than at present; in 1891 it was chosen as the temporary capital of the republic. Its wealth is derived from its now mostly abandoned silver-mines; but operations are still carried on at the tin-mines in the north near *Sepulturas*, so named from its ancient tombs, and in the south, near *Sorasora* and *Poopo*. These tin deposits, which occur at the point of contact of the porphyries with the schistose clays, formerly yielded from 1,000 to 1,500 tons annually, and the output has been increased since the Huanchaca railway has been carried northwards as far as Oruro. Here begins the difficult track, which climbs the slopes north-westwards to the Huaillas Pass leading down to Cochabamba.

Huanchaca was till recently a mere cluster of cabins passed by the few travellers between Potosi and the port of Iquique at an altitude of 13,460 feet.

But silver ores here occur in such quantities that a large population has been attracted to the district, which is now connected by a railway with the Chilian seaport of Antofagasta; the Huanchaca branch forms a junction with the main Oruro line at the station of *Uyuni*. This is the longest of all the railways ascending from the Pacific coast towards the Andean plateaux, and as the steepest gradients have already been constructed, it will soon be easily continued along the shores of Lake Titicaca to the Arequipa-Puno line.

The Huanchaca mines, whose rich ores have supplied the funds required to build this costly railway, were not opened till 1874, nor systematically worked with proper appliances till 1880. At present they yield more silver ores than all the rest of Bolivia, the output between 1877 and 1890 being valued at £5,200,000, and that of the single year 1890 at £820,000. Scarcely less productive are some other argentiferous lodes rediscovered in the district south of Huanchaca, at *Colquechaca*, near Lake Aullagas and in the *Lipez* mountains.

La Paz—Sorata.

On the Amazonian slope the foremost place is taken by the city of *La Paz*, which is the most populous in Bolivia, and which, although it has not been the permanent capital, may still be regarded as the true metropolis of the republic. The Bolivian Government has been described as being nearly always on its travels, shifting about in an erratic sort of way from Sucre to La Paz, Oruro and Cochabamba, according to the vicissitudes of wars and revolutions. On the least alarm generals and troops, ministers and officials with their archives and papers mount their saddle-mules and clamber up hill and down dale in search of a safer residence.

A preference, however, has always been shown for La Paz, thanks to its more advanced position towards the outer world. The attraction of Europe, which is reached by a somewhat direct route down the Amazons and across the Atlantic, has made La Paz the busiest place in Bolivia. Situated at a height of 12,465 feet, in the broad, steeply inclined gorge through which the great inland sea of the Titicaca depression formerly sent its overflow to the Amazons, and which is still watered by one of the chief headstreams of the Beni, La Paz is separated from the lake only by a sill with a gentle westerly slope. The long and rugged easterly incline has been surmounted by a narrow zigzag track, and heavy works have been projected to bring La Paz into communication with the Huanchaca and the Arequipa railways, as well as with the lacustrine port of Chililaya, where is situated the Bolivian custom-house on the south-east side of the lake.

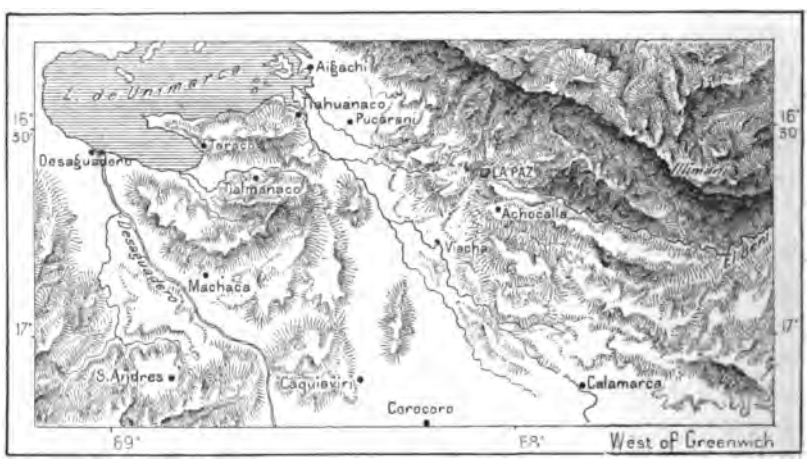
Chuquiabo was the name of the group of Indian dwellings which Alonzo de Mendoza replaced in the middle of the sixteenth century by the Spanish city, bearing the religious title of *Nuestra Señora de la Paz*, "Our Lady of Peace." After the War of Independence, which was here begun by the revolt of 1809, it took the patriotic name of *La Paz de Ayacucho*, in honour of the final victory of the national arms. At the point where the city rises in amphitheatrical form on

the slopes, the quebrada (gorge) expands to a broad lacustrine basin, which was afterwards discharged through a ravine caused by erosion.

The houses of La Paz are constructed on both sides of the rivulet, whence a view is commanded of the lower valleys beyond the winding and verdant quebrada. But the city lies too high for its gardens and promenades skirting the torrent to nourish any but a stunted growth of hardy apples and other trees which, however, retain their foliage through the winter. Towards the south-east the horizon is bounded by the sparkling crest of Illimani. The La Paz torrent, as well as the neighbouring brooks, washes down auriferous sands. But the local mining industry has no longer the importance that it formerly possessed, and La Paz owes its present prosperity to the traffic carried on with the agricultural districts of the Yungas, which here exchange their produce for foreign wares.

Fig. 144.—La Paz and Environs.

Scale 1 : 2,000,000.



38 Miles.

The only noteworthy monument is the sumptuous cathedral, built at a time when the silver-mines of Potosi were controlling the money markets of the world. European culture is represented by a university, some high schools, and other educational establishments.

Below the gorge the La Paz takes the name of Beni, and is joined by several auriferous streams from the great mining district, which is approached by several difficult routes, such as those of the Rio Coroico, or of the Sorata (Caca or Maipiri). Towards the source of this river stands the health resort of *Sorata*, a large place before the insurrection of Tupac Amaru in the eighteenth century. Here all the Spaniards of the surrounding districts had taken refuge; but instead of waiting to reduce them by siege operations, the descendant of the Incas created a temporary reservoir higher up, and then suddenly discharged its contents on the doomed city. Those who survived the avalanche of slush and water perished by

the sword. Sorata still does an active trade with the mining region of *Tipuani*, the "Gold Potosi," which yielded £2,000,000 between the years 1818 and 1868.

Coroico, lying on a fertile terrace farther north, an "earthly paradise" of banana and orange groves, is the chief centre of the coca and other plantations of the Yungas region. The botanist Joseph de Jussieu, who resided at Coroico in

Fig. 145.—La Paz—Palace of Congress.

1740, studied the properties of the coca plant, which he was the first to introduce into Europe.

Cochabamba—Santa Cruz.

Cochabamba, the "Plain of the Lake," so named from the now dry lacustrine depression where it stands at a height of 8,300 feet, is scarcely inferior to La Paz as a centre of population, despite its unfavourable position for trade in the rugged

district about the source of the Mizgue affluent of the Rio Grande. But the difficulty or lack of communications is counterbalanced by its excellent soil and climate. The well-cultivated plain yields wheat in abundance, as well as other produce utilised by the numerous local industries—woollen and cotton spinning mills, tanneries, soap and starch works. The trade of this flourishing department is estimated at one-fourth of the exchanges of the whole republic. Its chief exports are coca-leaves, cereals, flour, horned cattle, wool, and beer, taken in exchange for cotton fabrics, mostly from North America. The neighbouring mines are no longer worked.

Santa Cruz de la Sierra is so called, not because of its elevation, for it stands at the entrance of the plains not more than 1,450 feet above the sea, but in memory of an upland town from which the inhabitants removed to this place. The neighbouring Rio Piray (Sara) is not navigable, but the Rio Grande, a little farther east, is accessible to boats, and well-beaten tracks radiate in all directions across the savannas and forests. Thus Santa Cruz occupies a central position as the starting-point for all travellers proceeding eastwards in the direction of Chiquitos, Matto Grosso and Paraguay.

Potosi—Sucre.

Potosi was two centuries ago the most populous city not only in Bolivia, but in the New World. Despite its great elevation of 13,325 feet, its prodigious mining wealth had attracted a population of 160,000 to a place which now ranks only as the fourth city of the republic. Of the children born at this tremendous altitude, some die at once, while others remain blind or deaf. Founded in 1545 under the name of *Villa Imperial*, it stands at the foot of the bare, yellow Cerro de Potosi (15,380 feet), which was in times past described as a silver cone, and which was in fact traversed by powerful argentiferous lodes in every direction. It had been transformed by over five thousand galleries into a vast underground labyrinth; but the excavations have for the most part collapsed, while the deepest pits have been flooded by water. Nevertheless mining operations, formerly so productive, have not yet been entirely abandoned; the annual output is still valued at £160,000, which is an insignificant sum compared with the total yield, exceeding £320,000,000, according to the lowest estimates. Potosi alone would appear to have supplied the world with one-twelfth of the precious metals which have found their way into general circulation since the discovery of America.

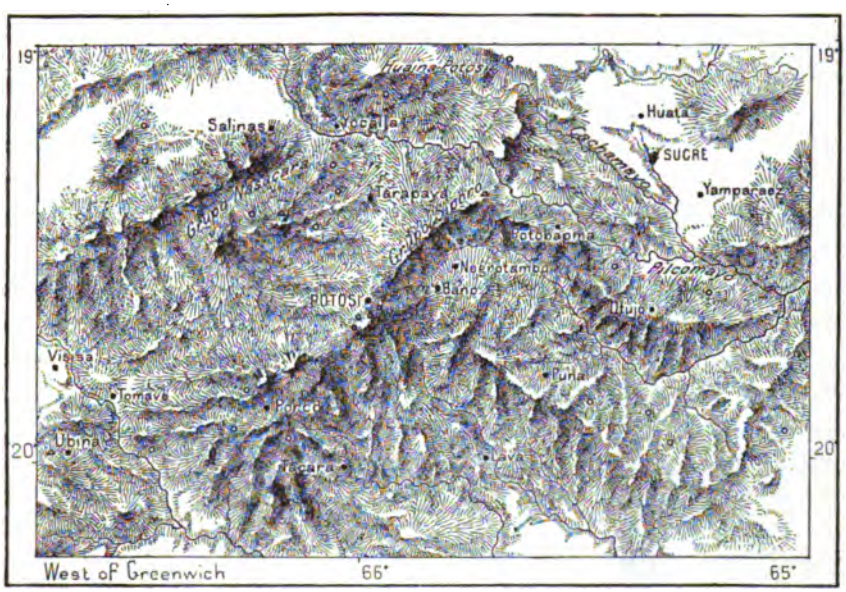
The now partly-ruined city contains sumptuous buildings, eloquent witnesses to the vast treasures at the command of their builders. The mint, which is no longer used, terminates in a magnificent open roof, the timber for which was transported across the crests of the Andes from the forests of the Rio Salado in Argentina, some 600 miles away. The aqueducts are also remarkable monuments of those halcyon times, and the dammed-up lakes, fed by the snows of the Andacahua Sierra, now yield far more water than is required by the inhabitants,

and for the reduction of the ores. In the neighbourhood of Potosi are some mineral waters.

Sucre, which at the beginning of 1892 was still the official capital of Bolivia, lies like Potosi in the upper Pilcomayo basin, but on the opposite slope and at a much lower elevation (8,850 feet). It was owing to this relatively moderate altitude that it owed its importance during the flourishing days of Potosi, whose wealthy inhabitants had made it a health resort and place of rest. At that time it bore the Quichua name of *Chuquichaca* (*Chuquisaca*), that is, "Golden Bridge," a name suggestive of the boundless mineral treasures of this region. It also bore

Fig. 146.—Potosi and Sucre.

Scale 1 : 2,000,000.



Gold. Silver.

88 Miles.

the name of *La Plata* (*Chuquisaca de la Plata*), while it received its present official title in honour of Marshal Sucre, who gained the decisive battle of Ayacucho.

Sucre stands on a sloping terrace at the foot of the mountains, where it is surrounded by deep gorges in the centre of a superb amphitheatre of lofty summits. Its university and colleges earned for it the perhaps somewhat ambitious title of the "Athens of Peru," at a time when it still belonged to that region. Sucre is at present an important agricultural centre for the cereals and other produce of the temperate lands. Its potters prepare little vases of an argillaceous earth, which are sucked like chocolate, and the moderate use of this clay does not seem to be injurious. As at La Paz, "clay dumplings" are eaten with potatoes (Weddell).

Cinti—Tarija—Trinidad.

Cinti, Tupiza, and *Tarija,* standing at a lower altitude and a higher temperature in South Bolivia, are surrounded by far more productive plains. Cinti, the ancient *Camargo,* on a secondary affluent of the Pilcomayo, is embowered in verdure amid the reddish walls of bare rocks, and its vineyards produce one of the best wines in America.

Tupiza, on a tributary of the upper San Juan, a main branch of the Pilaya, is the chief riverine port for the trade with Argentina. North of this place a mine in the Sierra de Chorolque is worked at the tremendous altitude of 17,420 feet, that is, 1,640 higher than Mount Blanc.

Tarija (5,810 feet), on an affluent of the Bermejo, is famous throughout all the land for its fertile soil, yielding corn, fruits, vegetables, fodder, all of prime quality, with little care on the part of the growers. Tarija recalls Southern Italy with its blue skies, rugged mountains, fertile valleys, and excellent produce of all kinds. During the revolutions in the neighbouring republic of Argentina it has often served as a place of refuge for the politicians of the vanquished party. Here, as at Cinti and Santa Cruz de la Sierra, the women greatly predominate over the men, who are usually widely scattered over the surrounding haciendas.

East of the Andean spurs the only groups of habitations in the valleys and on the plains of the Chiquitos territory are the villages attached to the missions and the camping-grounds of the Indians. One of these, *Trinidad,* near the right bank of the Mamore, serves as capital of the department of Beni, which comprises all the north-eastern part of the republic. A few military stations line the banks of the Paraguay on the eastern frontier of Bolivia.

VII.

Material and Social Condition of Bolivia.

Till recently the relatively sparse population of Bolivia received but slight additions from immigration. Even still, European and North American settlers are rare, numbering certainly less than a thousand altogether. But the conterminous districts receive a large number of immigrants from Peru, Chili and Argentina, chiefly miners, traders and labourers. The Chilians, especially, have poured like invaders into the mining district of Huanchaca.

On the other hand, the Bolivians are easily tempted to descend from their plateaux to the more temperate or more fertile lands belonging to the neighbouring states. Thus a natural equilibrium is established between the inflow and the outflow. Apart, therefore, from some great social changes modifying the system of land tenure and throwing open the boundless eastern plains to wholesale immigration, Bolivia will have to depend upon her own resources for the gradual

settlement of regions vast and fertile enough to support a population of many millions.

But during the present century the natural increase has been extremely slow. No doubt in ordinary years the birth-rate greatly exceeds the mortality, occasionally by as much as two-thirds. But many sections of the community are wasted by epidemics; they perish in myriads, and at times whole districts are changed to solitudes. Statistical observations show that the zone of mean altitude is peopled most rapidly; lower down the births are very numerous, but they are nearly equalled by the deaths; higher up in the puna region large families are rare. On these uplands the aborigines appear to resist the rigorous climate even less than the whites and half-breeds. Here a disorder known as "yellow fever," though quite different from that of the West Indies and Brazil, assumes a contagious character, and carries off the patient usually on the third day. A mottled skin, due to the disappearance of the natural pigment, is one of the commonest affections amongst the Bolivian Indians.

Agriculture.

Long neglected, owing to the greater attraction of the precious metals, agriculture has resumed its importance as the chief industry of Bolivia, and has even made rapid progress in some districts, and especially in the department of Cochabamba. The patient and industrious natives apply themselves with intelligence to tillage, stock-breeding, dairy-farming, the preparation of cheese, jams and other preserves. The potato is the staple food taken in the form of *chuño*, a freezing process in which its natural flavour is completely changed.

On the slopes of the Yungas zone the Indian peasantry display as much skill as those of the Vivarais or of the Riviera of Genoa in retaining the steep declivities by constructing a series of superimposed inclines with the fragments of rocks. The flanks of the hills are thus disposed in the so-called *pircas*, terraces rising one above another, each with its own carefully-tilled plot. Besides the alpaca, they rear a fine breed of asses, the only pack-animals employed on the eastern plains.

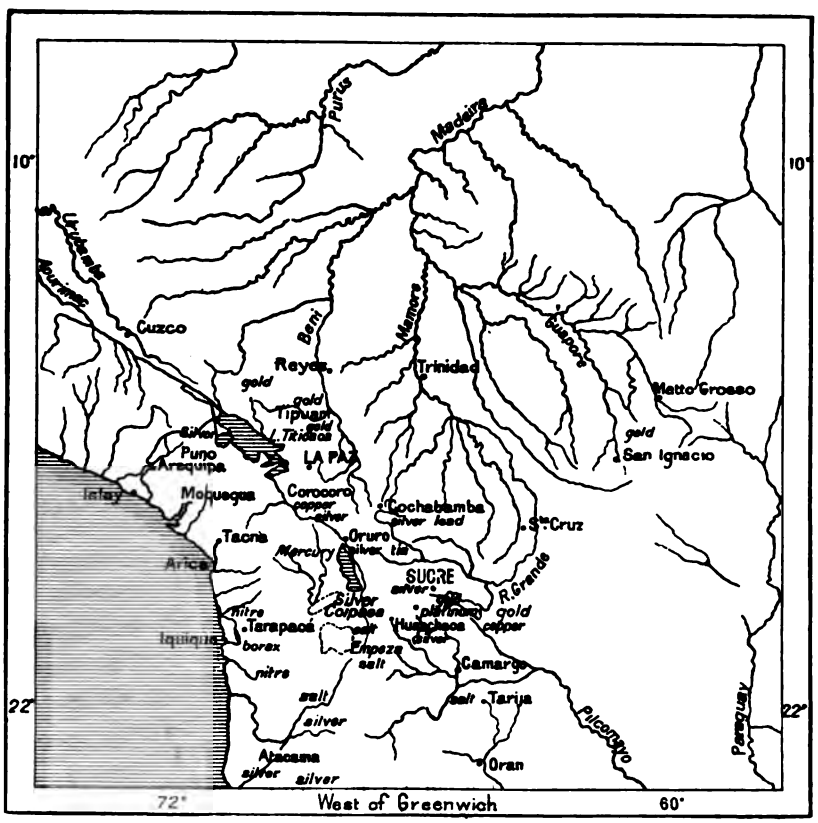
The Bolivian peasantry would be model farmers if they were personally interested in the results of their labour. But they possess nothing. The live stock belongs for the most part to large proprietors, whose tenants are not a few Indian labourers, but whole village communities, family groups and clans. The lands under tillage are themselves merely parts of vast domains whose owners, nearly all absentees, direct the works through agents and middlemen. The Aymara peasants, who are deprived of all motive for improving their position, indemnify themselves with their numerous feasts, always ending in drunken orgies. Drink has thus become the national vice.

A new zone of agricultural enterprise is being gradually developed in the region of the eastern Yungas. Within a recent epoch, the capitalists who had received government concessions of vast domains in these favoured lands, occupied themselves exclusively with the cinchona industry. The native *cascarilleros*,

"bark strippers," had no occupation except that of searching the forests in all directions in quest of the finest trees. A period of systematic culture had even succeeded to that of the reckless destruction of the spontaneous growths in the forests of the Yungas valleys. Four million trees had been planted, of which 500,000 had arrived at maturity, when the propagation of the plant in India, Java and other regions, arrested the progress of the industry in Bolivia, where the absence of communications made all competition hopeless. The bark fell rapidly in

Fig. 147.—Chief Mineral Deposits of Bolivia.

Scale 1 : 18,000,000.



price, and the planters were compelled in many districts to give up the struggle and turn their attention to the cultivation of coca; in 1885 the coca crop was valued at £343,000, and some of the exquisitely-flavoured Yungas coffee has also begun to reach the European markets.

But cinchona has been chiefly replaced by rubber, and this new industry has done more than scientific zeal to forward the exploration of the eastern streams flowing to the Madeira or directly to the Amazons. In the basin of the Madre de Dios the rubber-seekers are already acquainted with all the valleys, and have

opened tracks in all directions, enabling them in their daily rounds to visit every plant, usually about 150, comprised in their beat. According to Guillaume, this industry began on the banks of the Madre de Dios in 1883, and spread rapidly throughout the whole region. In 1890 about 3,000 persons found employment in this district preparing or forwarding the rubber. The variety cultivated in Bolivia is the siphonia, a member of the euphorbia family, of which there are three distinct species.

Mining—Trade.

The mining industry, which had languished for many years after the War of Independence, has again become very active. Yet the auriferous deposits, though by no means rare, have caused many disappointments. The sands of the Maipiri, the Tipuari and some other torrents in the Yungas region are, however, now carefully washed. But as in the flourishing days of Potosi, silver is still the most abundant metal, the ores of most of the Bolivian mines being extremely rich. Those of Huanchaca, which of late years have become the most important in the world, contain seven-thousandths of silver; but in the Oruro mines lodes are frequently met with as much as one-tenth of pure metal. Elsewhere the proportion rises to 50 and even 75 per cent.

Nearly all the foreign exports, which formerly included wool and bark, now consist of silver, copper and other metals. Europe, Chili and the United States take the ores in exchange for manufactured goods, while Argentina supplies pack-animals and oxen in return. The greater part of the foreign trade is carried on with Great Britain. In 1890 the collective exchanges were valued at £3,000,000, and in 1889 silver was exported to the value of £1,340,000.

Communications.

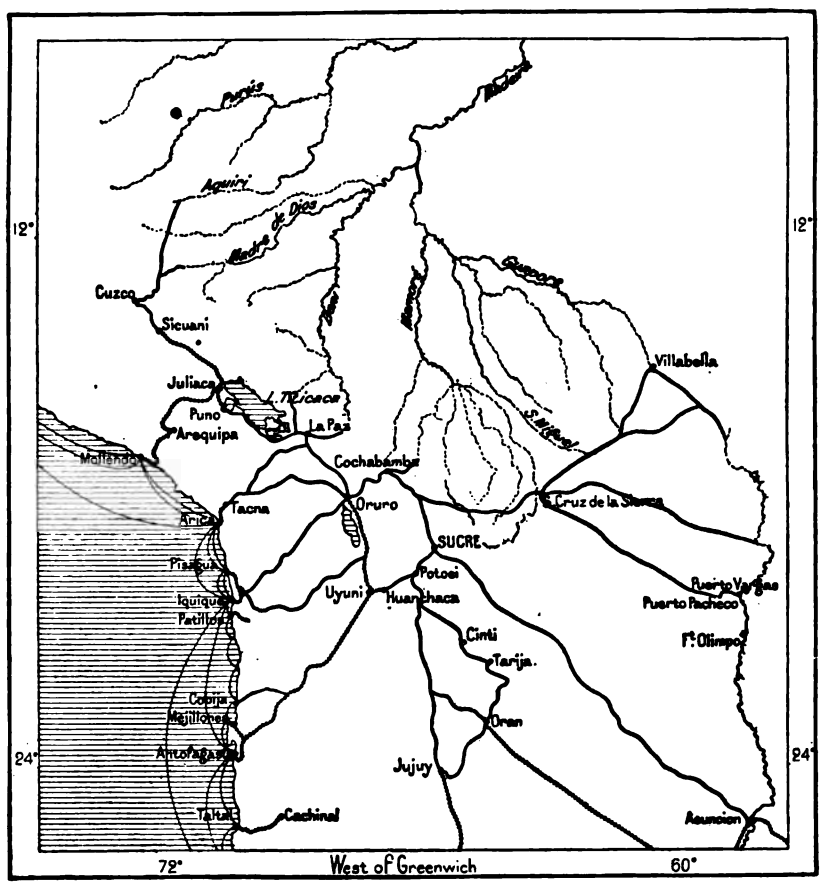
But in Bolivia the development of the mineral and other industries is entirely a question of communications. Even the Huanchaca mines would have failed to acquire their present importance, but for the completion of the railway connecting them with the Chilian port of Antofagasta. Thanks to this line, 574 miles long, as far as its present inland terminus at Oruro, Bolivia now possesses the chief trunk line, with which all the projected branches may easily be connected. From the elevation of over 13,000 feet, which has already been reached, nothing remains except to descend eastwards in the direction of Sucre, La Paz, Cochabamba, Santa Cruz de la Sierra and the plains. On the plateaux themselves, the track will be laid nearly at a dead level along the shores of Titicaca, in connection with the steamers now plying on the lake. Between the opposite ports of Puno or Puerto Perez and Chililaya the distance is about 114 miles. At Chililaya begins a carriage road, running south-eastwards in the direction of La Paz, and now regularly served by diligences.

Progress has also been made in the direction of Argentina. Here the lines

running from Buenos Ayres in the direction of the Bolivian Andes, have already reached the villages near the frontier, from which it would be easy to carry them to the towns of Tarija, Cinti and Sucre. With the completion of this system the isolation of Bolivia would cease; but at the same time a political danger would

Fig. 148.—International Communications of Bolivia.

Scale 1 : 19,000,000.



arise similar to that created on the opposite side by the Chilian line between Antofagasta and Huanchaca.

On the one hand, the political independence of Bolivia is threatened by the influence of Chili strengthened by the mining interest; on the other, Argentina, which already claims a portion of Bolivian territory, would become an extremely dangerous neighbour. Buenos Ayres, the largest city in South America, might

remember that the ancient province of Charcas, that is to say, the whole of Bolivia, was comprised within its jurisdiction in colonial times.

In the direction of Paraguay, the towns of the Bolivian sierra are still connected only by tracks crossing the forests and savannas, although the distance in a straight line scarcely exceeds 400 miles. Obstacles, such as swamps and rocks, might easily be turned, for in this low water-parting between the Plate and Amazons there are no large rivers. The thorny scrub, which in many places forms an impassable barrier for ordinary wayfarers, would present no difficulty for railway "navvies." Here the Pilcomayo might at first sight seem to offer the natural highway for the passenger and transit trade between Bolivia and the lower Paraguay; but the Pilcomayo is not a navigable river, as was discovered by Crevaux, Thuar and several other recent explorers.

VIII.

Administration.

Bolivia, which was constituted an independent state in 1825, under the name of the "Bolivar Republic," had placed itself under the special protection of the "Good Father," as the "Liberator" was called. He was not only entrusted with the supreme power as President, but was also invited to draft a social contract at his own pleasure. Thus was issued under his direct inspiration the "Bolivian Code," that is to say, the National Constitution, which he intended to become the Magna Charta of a universal confederacy of the South American republics. It was in reality, under a new and complicated form, an organised system of hereditary power, in a word a monarchy in disguise.

The Chamber of Tribunes, named by certain electors in the second degree, was to vote the laws relating to finance, peace and war; while the Chamber of Senators, elected by the same voters for eight years, would occupy itself mainly with questions of jurisprudence and religion. But in case of collision between these two elected bodies, a third body called the Chamber of Censors, whose members were to be elected for life, was to interpret the meaning of the Constitution, and recall the other Chambers to a sense of duty, respect for laws and treaties.

The president, on his part, also elected for life, would be assisted in his functions by a vice-president chosen by himself and designated beforehand as his successor. In 1836 the Bolivian Congress voted by acclamation the Code brought forward by the dictator; which, however, was very far from realising the expectations of its promoters. In none of the Hispano-American states, so often convulsed by civil strife, have political murders been more numerous than in Bolivia.

At present the Bolivian Government, like that of the other South American republics, comprises three distinct and nominally independent centres of authority,

as required by the theory of its paper Constitution. The legislative power consists of two houses elected by direct popular suffrage, a senate of sixteen and a lower house of sixty-four deputies. The executive, in other words the president, should also be elected by the people; but most frequently he elects himself by the summary process of presenting himself before Congress at the head of his troops. In fact nearly all the presidents have hitherto been professional soldiers,

Fig. 149.—Political Divisions of Bolivia.

Scale 1 : 18,000,000.

seizing the reins of state by force, by force expelled, and for the most part assassinated or dying in exile.

In abnormal times, as the intervals between the chronic revolutions may be called, the president, nominated for four years, is assisted by a council of five ministers of state—the secretaries of foreign affairs, finance, administration, war, justice and public instruction. In case of death or deposition he is replaced by a vice-president, who, should the occasion require it, may be supplemented by a second functionary of like standing. The president names most of the higher

civil, political and military officials, appoints and deposes the prefects, sub-prefects and corregidores (justices).

The third centre of power is constituted by the magistracy—a supreme court of appeal, district courts, and cantonal tribunals with an array of judges, and the so-called "parochial alcaldes," parish justices. The departments (provinces) are governed by prefects with "supreme administrative and military authority." But as each provincial capital has its municipal council, there still remains a shred of local self-government.

Army—Finance—Education.

The army, which is likewise at the disposition of the president, comprises a peace footing of from 1,500 to 4,000 men, and during war as many able-bodied troops as the authorities can manage to muster. At times the generals have had as many as 10,000 of all arms under their command. Military colonies have even been founded in the Chaco territory.

In 1892 a conscription law was passed, which came into operation the following year, and which makes military service compulsory on all citizens from twenty-one to forty years of age in the line, the reserve and the extraordinary reserve. These reserves constitute a national guard, in which military service had always been obligatory. The annual expenditure for military purposes averages about £365,000.

The yearly revenue, mostly showing a deficit, is drawn chiefly from the mining and custom-house dues; but along such a vast and ill-guarded frontier it is easy to defraud the state. It may even be regarded as fortunate for the slight trade of Santa Cruz de la Sierra with the neighbouring states that the Bolivian Government has been strong enough to enforce payment of the imposts charged on goods passing the frontier. The custom-house officers are, no doubt, always found in their place, but being unsupported by troops they are unable to levy the dues on the traders, who treat them with contempt. According to Fernandez, the Bolivian treasury has thus lost millions of dollars since the issue of the futile tariff laws. The indemnity due to Chili after the last war is levied on the goods passing through the custom-house which Bolivia keeps in the Chilian port of Arica; two-fifths of the yearly revenue derived from this source are guaranteed to the Chilian Government. The commodities introduced into Bolivia through Antofagasta, and on the Argentine frontier through Tupiza, are charged with no special transit dues.

In 1893 the estimated revenue from all sources was £1,147,000, and the expenditure £1,187,000. In the same year the internal debt was £1,090,000, and the foreign £124,000, giving a total of £1,214,000. But, while the internal debt remains somewhat stationary, the foreign is rapidly being paid off.

Public instruction, although in theory "gratuitous and obligatory," is nevertheless much neglected. In 1890 scarcely more than a sixtieth of the whole

Bolivian population was receiving even elementary instruction. On the other hand there are no less than five "universities," with a collective staff of 83 professors in the three faculties of law, medicine and theology, and a total attendance of nearly 1,400 students, besides 16 secondary schools or colleges with over 2,000 pupils. These are exclusive of a military school with a staff of nine professors maintained by the government, which also contributes about £10,000 to the yearly support of the public primary schools.

Bolivia is divided into eight administrative departments, which are officially called "provinces," and which, with their estimated areas and populations according to various official returns between the years 1880 and 1888, will be found tabulated in the Appendix.

CHAPTER IX.

CHILI.

I.

THE southernmost republic of the Andean regions occupies on the Pacific seaboard an elongated zone, extending a total distance of no less than 3,000 miles in a straight line, and comprising over one-half of the South American seaboard between the Gulf of Panama and Cape Horn. But its breadth is far from corresponding to this enormous expansion in the direction of the meridian. Before the recent annexations of Bolivian and Peruvian territories, Chili proper was everywhere bounded inland by the crest of the Andes, which here especially run close to the coast. Towards the tapering extremity of the continent its domain is even still reduced to a few uninhabited escarpments of the Cordilleras between the Patagonian plains and the archipelagoes fringing the seaboard.

In the interior no state of this slender elongated form could possibly be held together under any circumstances; at the first shock it would necessarily break into fragments, each with its special centre of attraction. Even the Italian peninsula, although a maritime region with a perfectly defined geographical unity, was nevertheless till recently broken into a number of distinct states, and even territories distributed amongst foreign powers.

Recent Conquests.

The persistence of Chili as a homogeneous state, possessing even more close cohesion than most of the other South American political communities, is explained by the vicinity of the sea. To the oceanic waters, traversed along the whole length of the Chilian coast by the Antarctic current, this region is indebted for its distinct physical unity. All the most distant points of the seaboard are brought into almost close proximity by the vessels plying in these waters. They also enjoy

the advantage of a great centre of attraction in Valparaiso, chief seaport of the republic, which lies about midway between the extremities of the long coast-line.

Analogous positions were held in ancient times by Phœnicia, and afterwards by Greece, which, thanks to the command of the sea, were able to enlarge their narrow bounds by numerous colonies along the shores of the Mediterranean. In mediæval times, also, Venice founded a maritime state stretching all along the east side of the Adriatic, and in our own days Great Britain, which "rules the waves," encircles the whole globe with its zone of colonies, constituting a vast maritime empire which is destined to last as long as the naval supremacy of the mother country.

Thus enjoying substantial geographical and political unity, Chili tends even to expand, and hitherto the fortune of war has been favourable to her in the conflicts with her northern neighbours. In 1878 Bolivia, ill-advised by Peru, wishing to replace the revenue derived from her exhausted guano beds by heavy duties on the nitrates, had imprudently offended the Chilian traders working the Bolivian deposits. Taking as her motto, "By right or might," Chili took up the cause of her subjects, mostly wealthy members of the local aristocracy. A few months after the declaration of war, the Chilian fleet, having triumphed over the Peruvian ironclads, landed an armed force on Peruvian territory between Iquique and Arica. Victory followed victory, though sometimes dearly bought, especially before Tacna, and in storming the two lines of fortified works defending Lima.

In virtue of the treaty dictated by the conquerors, Chili, already in possession of the department of Cobija wrested from Bolivia, annexed the Peruvian department of Tarapaca, containing the nitrate deposits which had given rise to the quarrel. She at the same time sequestrated for ten years the surplus revenues of Tacna, Arica, and of all the adjacent territory as far as the Andes.

These northern deserts, which the patriots of Chili had hitherto regarded as "providential barriers" against any attack from the north, were thus appropriated by the Chilians themselves, who even extended their conquests farther north. The superficial area of the republic, increased some 130,000 square miles by these annexations, was thus nearly doubled at a single stroke, and is at present estimated at 294,000 square miles, or nearly two and a half times that of the British Isles. Even if the department of Tacna be surrendered in 1894 for an indemnity of £2,000,000, or if, as the Bolivians hope, it be presented to them as a peace-offering to cement a permanent alliance, Chili will still be the gainer, adding to military renown the reputation of generosity.

Islands—Boundaries—Extent—Population.

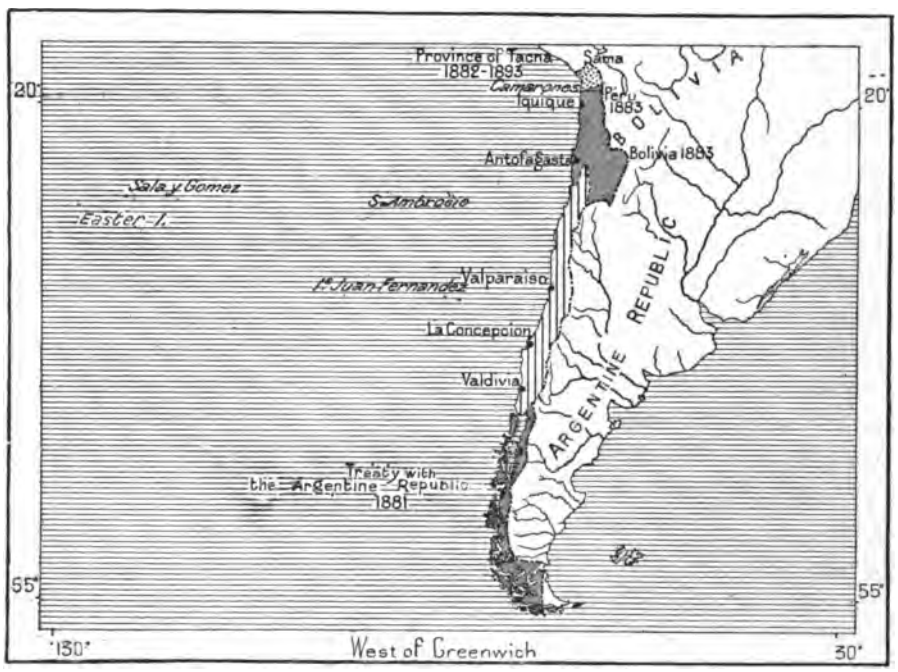
As a naval power Chili has also added some insular groups to her territory on the mainland. The islets of San Ambrosio and San Felix, as well as the little Juan Fernandez archipelago lying within 600 miles of the continent, fell naturally to her share in the general dismemberment of the Spanish colonial empire. To these were afterwards added the larger Easter Island and Sala-y-Gomez by the

simple process of occupation. Before this occurrence Easter Island (Waihu) was generally regarded as belonging to France, the only planter who had settled there some years previously being a Frenchman, while his Tahitian coolies were French subjects.

But however well equipped Chili may be compared with some other South American countries, she is nevertheless exposed to great dangers at the hands of the conterminous republic of Argentina, from which she is separated only by a conventional line not yet definitely laid down on the official maps. Along a frontier of no less than 2,000 miles frequent occasions of dispute must necessarily

Fig. 150.—Conquests of Chili.

Scale 1 : 60,000,000.



arise, and in the absence of a mutual friendly feeling the settlement of conflicting interests will need much wise and conciliating diplomacy.

At least one great difficulty has, however, been already tided over by the peaceful arrangement in respect of Tierra del Fuego. Till the year 1881 all the Magellanic lands with the archipelagoes at the southern extremity of the continent had remained unappropriated, both parties, so to say, claiming "all or nothing." But in that year a compromise was effected by a treaty concluded at Buenos Ayres, though the boundary then laid down follows the crest of the divide between the Pacific and Atlantic slopes only as far as 52° south latitude.

Here the frontier runs due east, coinciding with this parallel to its point of intersection with 70° longitude west of Greenwich, beyond which it follows the crest of a chain of hills to the Dungeness headland on the north side of the Atlantic entrance to Magellan Strait.

In Tierra del Fuego proper, the frontier runs from Cape Espiritu Santo due south to Beagle Channel, thus coinciding with 68° 34′ west of Greenwich. All the groups of islands lying south of Beagle Channel belong to Chili, in whose territory are consequently comprised the Diego Ramirez islets with Cape Horn, southernmost headland of the New World. On the other hand, the Staten Island group, situated to the south, but at the eastern extremity of Fuegia, is assigned to Argentina. Magellan Strait itself is held to be neutral, and freely open to the ships of all nations. Here the contracting powers undertake to raise no fortifications or military lines calculated in any way to obstruct the navigation of the great inter-oceanic passage.

As regards the long Andean frontier running north and south between the two states, the very text of the treaty itself already gives rise to different interpretations in stipulating that "the parting-line shall be drawn over the highest summits which mark the divide between the slopes." But a line bounding from peak to peak in no way coincides with one separating the two opposite watersheds of a drainage area. Thus, to give only one case in point, to which of the two republics will belong Aconcagua, loftiest of American mountains? If the boundary is to follow the highest crests it must pass over the dome of this mountain, which will become the international corner-stone. If, on the other hand, the limit is to coincide with the divide between two slopes, the whole mass of Aconcagua will be included in Argentine territory. The delineation has to be made by three delegates, two specially representing each state, and the third chosen by mutual agreement to give a casting vote, serious disputed cases being referred to the final arbitration of some friendly power.

In respect of population, although making rapid progress, Chili occupies only the fourth place amongst the South American nations, being surpassed not only by Brazil and Argentina, but even by Colombia. The population is increasing in all the provinces, but especially in those of the central region round about the capital and its seaport, Valparaiso, as well as in the agricultural districts. The southern section between the island of Chiloé and Cape Horn, is almost uninhabited, while the northern lands, wrested from Bolivia and Peru, are relatively ten times less peopled than the original provinces.

Geographical Discovery—Pioneer Work.

Geographical exploration, already far more advanced than in any of the other Andean lands, is still progressing systematically. Although begun later than in the Atlantic sections of the South American seaboard, its starting point was a discovery of primary importance, that of the sinuous strait intersecting the southern extremity of the continent. Nevertheless, Magellan, who had the good fortune to

first traverse this gateway of the two oceans in 1520, continued his voyage of circumnavigation without waiting to survey the Fuegian Archipelago or the adjacent coastlands.

Even Loaysa's squadron, which penetrated into the strait five years later, made no further discoveries in these waters, although weatherbound for several months by head-winds, fogs and snowstorms. One only of Loaysa's vessels, driven by a tempest beyond the eastern (Atlantic) entrance of the strait, passed southwards to a place which, to the crew, seemed the "land's end," and which was, doubtless, one of the southern islands of the Fuegian archipelago. At the outlet of the strait another of the vessels, that commanded by Guevara, steered northwards and ultimately reached New Spain (Mexico), without, however, sighting any of the South American coastlands. In 1540 Alonzo de Camargo succeeded in coasting these shores between Magellan Strait and one of the Arequipa ports, and thus began the land expeditions in Chilian territory.

So early as the year 1534 a royal decree granted to Almagro the fief of Nuevo Toledo, south of Peru, requiring him to reduce and colonise the land. This region, still unknown to the Spaniards, was the country to which the Quichuas gave the name of Chili or Chile, a name which ultimately prevailed, and which has probably the meaning of "cold." Compared with the shores of Peru, those of Chili have, in fact, a much lower temperature, which during one season is distinctly cold.

In 1535 Almagro, following the route of the plateaux, and then making a detour eastwards to avenge the murder of a Spanish envoy, crossed the Andes in one of the most elevated regions of the crest, and thus penetrated into the vast domain which he was commissioned to reduce. Copayapu, the Copiapó of the Spaniards, being a dependency of the Quichua empire, made no resistance, and meekly surrendered its treasures in compliance with the orders of the Inca's brother, who accompanied Almagro.

After passing Coquimbo, the conqueror sent forward his lieutenant, Gomez de Alvarado, who followed the coast "very near the world's end," as far as a land where the people were clothed in sealskins, and where rain fell in abundance. The expedition came to an end probably at the river Maule, for farther on begin the forest regions inhabited by Indians who had never submitted to the Quichua yoke, and who would undoubtedly have stoutly resisted the intruding strangers. Nor had they any gold to attract the invaders, who retraced their steps towards Peru, following the maritime route across the arid Atacama and Tarapaca solitudes. With these two journeys were connected all subsequent expeditions of conquest and settlement.

In 1540 Pedro de Valdivia resumed the work of exploration. Passing the point where Almagro had stopped, he founded the city of Santiago, which has remained the capital of the country, and then pushed on from stage to stage as far as the Rio Biobio, limit of the territory of the Araucanians. Here the conquerors came into collision with men of resolute courage. They succeeded at first in founding a few military posts, and even some colonies; but the natives maintained a ceaseless war of surprises and open conflicts until the Spaniards

were compelled to withdraw, when the forests resumed possession of the foreign settlements.

For three centuries all exploration ceased in the interior of Araucania; but south of the territory of these valiant natives the maritime districts continued to be gradually annexed to the great colony of Chili. Thus, after the death of Valdivia, clubbed by an Araucanian, Garcia Hurtado de Mendoza penetrated into the island of Chiloé, accompanied by the poet, Alonzo de Ercilla, who inscribed his heroic lines on the bark of trees.

This occurred in 1558, and in the same year the navigator Ladrilleros again explored Magellan Strait to study the nature of its currents, which were popularly supposed to set like a river always in the same direction from the eastern to the western entrance. He found, on the contrary, that the waters were in a state of perfect equilibrium at both entrances, and proved it by navigating in both directions between the "South Sea" and the "North Sea" (Pacific and Atlantic).

But no colonies, properly so-called, were established beyond Chiloé Island, where was founded the settlement of Castro in 1566, and where for over two centuries the Spanish documents reported *la fin de la Cristianidad*, "the end of Christendom."

A maritime expedition under the pilot Fernando Gallego was shipwrecked on an island in the Fuegian Archipelago towards 49° south latitude. But a better fate awaited Juan Fernandez, who, during a voyage between Callao and Valparaiso, kept far out on the high seas to avoid the coast-winds blowing from the south, and so discovered the islands named from him, which afterwards acquired great importance as ports of call and victualling stations.

First Explorations of Tierra del Fuego.

While the discoveries of the Spanish mariners remained almost unknown beyond the Peninsula, the expeditions of the English rovers and privateers acquired a word-wide celebrity. At this epoch the memory of Magellan's famous voyage of circumnavigation was already fading into a dim past, and even some Spaniards, such as Ercilla in his *Araucania*, asserted that the route had been lost, "either because the entrance was no longer known, or because an island hurled by the stormy sea and the fierce gales had blocked the passage."

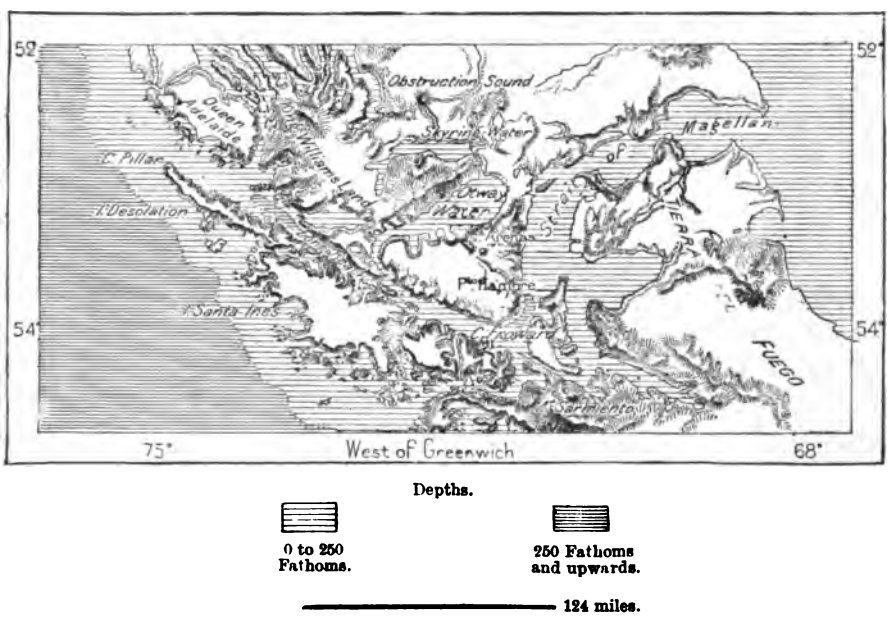
On the part of the Spanish Government the ignorance was intentional; all captains navigating the southern seas were strictly forbidden to engage any foreign sailor among their crews, as the gate of the great ocean covering half the globe was to remain closed. At this time Drake was preparing his expedition to plunder the Spanish colonies on the shores of the Pacific in the New World. In 1578 he rediscovered and successfully steered through Magellan Strait; then being driven southwards he discovered the west side of the Fuegian Archipelago, the east side of which had already been sighted by Hoces. After the

most successful plundering expedition ever undertaken by any rover, Drake completed his voyage round the globe by the Moluccas and Cape of Good Hope route, thus acquiring both wealth and fame.

Next year followed the far more fruitful, if less famous, expedition of Sarmiento de Gamboa to Magellan Strait. Gamboa was the first to introduce a spirit of scientific observation into his surveys. He carefully explored all the lands separating the large island of Madre de Dios from the strait, studying the channels, the bays and inlets, determining the exact position of the havens, sounding the depths, measuring the mountains, recording the directions of winds, tides and currents. Most of the names given by him have remained in the local geographical nomenclature. Then, passing into the strait, he dreams of a great

Fig. 151.—Magellan Strait.

Scale 1 : 6,000,000.



city with its towers and domes rising above its waters, and feels himself predestined to realise the vision. So he returned a few years later, in 1584, but with only one ship, solitary survivor of a considerable fleet with which he had sailed from Cadiz. Penetrating into the strait he founded two cities in succession, one, Nombre de Jesus, near the eastern entrance; the other near the middle, on a long peninsula terminating in the headland of Cape Froward.

The latter, which was henceforth to hold the key of the strait, arresting all passing vessels hostile to Spain, received the name of San Felipe, or Philippopolis, and here were settled 400 colonists, including 30 women. Unfortunately, Sarmiento, despite prodigies of energy and perseverance, was unable to keep them in supplies. The corn sent from Spain failed to germinate, and the

unhappy settlers, besieged by the Patagonians and abandoned by the whites, had no resources except fishing. Within three years all had perished of famine or exhaustion. Cavendish, who had followed in the wake of Drake, found nothing in the ruined settlement except frozen bodies. "Port Famine," the name given by him to the ill-fated colony, was adopted by the Spaniards themselves.

After the English came the Dutch corsairs, Mahn, Cordes, Sebastian de Weert, Olivier van Noort, who also ventured into the Fuegian waters without adding much to the geographical knowledge of the archipelago. Nearly a century had elapsed since Magellan's voyage, and Tierra del Fuego was still supposed to form part of a great Antarctic continent, although both Hoces and Drake had seen the "land's end." But the Amsterdam trader and geographical student, Isaac Lemaire, being convinced of the popular error, and firmly believing in the existence of an open sea, sent two ships in quest of it. They set sail in 1615 under the command of his son Jacob Lemaire and Schouten, and on reaching the southern extremity of the continent, having lost one ship on the way, they penetrated with the other into marine waters where a strong swell rolled up from the south-west, and where they met large schools of whales. From these indications they concluded that here was the sought-for passage, the "royal highway" between the two oceans. This was in fact the strait which has ever since borne the name of Lemaire. Eastwards they left the long Staten Island, believing it to form part of an Austral continent, and then far to the south doubled Cape Horn, supposing it to be a headland of Tierra del Fuego.

Thus was reached the Pacific Ocean and the western entrance to Magellan Strait, whence they sailed on the return voyage to the Moluccas. As a natural consequence of the then prevailing system of monopolies, Lemaire and Schouten were, on their arrival in Java, arrested by their fellow-countrymen and deprived of their vessel, as having infringed on the privileges of the Dutch East India Company, which claimed the exclusive right to explore the South Seas.

After the Dutch discoveries the Spaniards could not fail to revisit the southern waters, with a view to ascertaining whether it might be possible to close this "royal road," which offered such easy access to their Pacific colonies. Hence, Nodal was sent to Tierra del Fuego, to carefully study the coasts and survey the new passage. He circumnavigated the Staten Island group, but he was fain to recognise the impossibility of defending these waters by fortifications, and in 1624 the Dutch Admiral, L'Hermite, sailed through with a fleet in the hope of conquering Chili and Peru.

But his geographical work was more important than his military exploits. He discovered the Gulf of Nassau, and found that Cape Horn belonged to a distinct group of islands which still bear his name, modified by the Spaniards to Ermita. He determined their insular character, and it was henceforth known to all seafarers who ventured into these waters that here the Atlantic and Pacific intermingled over a wide expanse.

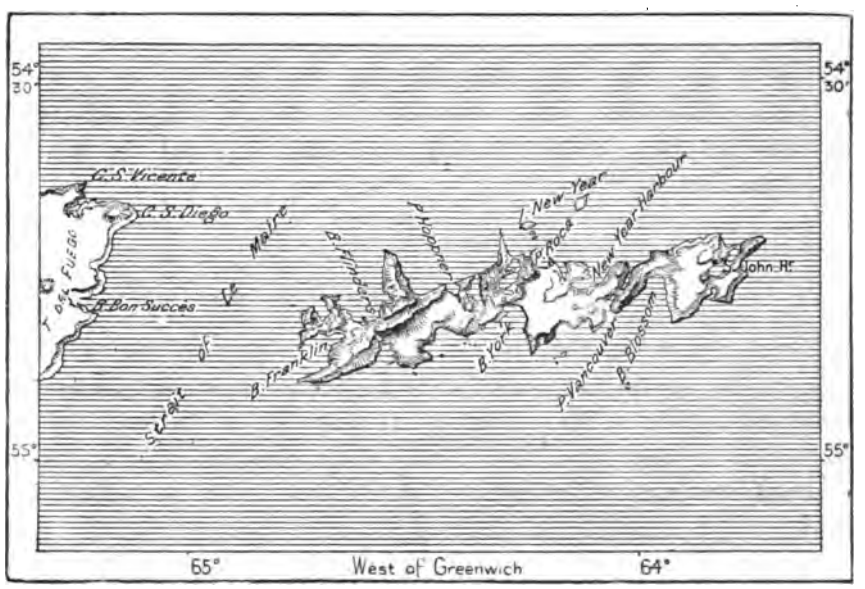
Marcant, the only French navigator who took part in these explorations, penetrated into Magellan Strait in 1713, in order to reach the west coast of America, but instead of following the Long Reach of the channel, he diverged into a lateral branch, now called Barbara Passage from the name of his vessel.

Meanwhile, the Jesuit missionaries had traversed Chili in various directions, and had prepared more accurate charts than those of the first navigators. In 1646 the missionary Ovalle had already had a map of Chili printed in Rome far superior to those previously issued. Sanson d'Abbeville had little to add when reproducing it ten years later.

Other missionaries had crossed the Andes to found stations amid the Patagonians of the eastern slopes, as appears from the ruins of ancient missions on the shores

Fig. 152.—Staten Island.

Scale 1 : 1,100,000.



of Lake Nahuel Huapi, discovered by Basil Villarino during his explorations in the Rio Negro basin in 1782. On their expulsion from Chili, the Jesuits brought away some valuable geographical materials. Ignacio Molina, amongst others, published at Bologna several works on Chili, in which is summed up all that was known of that region at the end of the eighteenth century, that is to say, before the period of political and social transformation which was soon to follow. Feuillée, a French priest of the Order of Minims, had approximately determined the longitude of the Chilian seaboard early in the same century. His observations remained uncontrolled till corrected by the mariners of various nations during the course of the present century.

Later Explorations of Tierra del Fuego.

After the establishment of the Chilian Republic, Great Britain, desirous of increasing her commercial relations with the regions which had till lately been interdicted to her traders by Spanish exclusiveness, organised the memorable expedition conducted by King and Fitzroy, and accompanied by the young naturalist Charles Darwin, at that time unknown to fame. This voyage of ten years, 1826 to 1836, was the starting-point of a new era in the geographical history of all the lands visited by the expedition. For the study of Argentina and Chili it had the same scientific importance as the earlier researches of Humboldt and Bonpland had for the regions at the other extremity of the continent.

The men of science on board the *Beagle* and *Adventure* completed in all its details the survey of the Magellanic lands. South of Tierra del Fuego proper, they discovered that remarkable fiord now known as Beagle Channel, which presents the aspect of a broad stream fringed with glaciers winding between Fuegia and the southern archipelagoes. They explored all the lateral sounds and inlets of Magellan Strait, of Otway and Skyring Water. North of the western entrance of the Strait, they also followed all its branches: Smyth Channel, Messier Channel, and the other countless fiord-like formations ramifying amid the labyrinth of islands already visited by Sarmiento.

Topographic and Coast Surveys.

North of Chiloé and of the Gulf of Reloncavi, they had little to do beyond rectifying the contour-lines of already well-known coastlands; but the observations of Fitzroy and Darwin on the geology of the seaboard, on the oscillations of the land, on its meteorology, flora, fauna, and all the phenomena of the terrestrial planet formed the basis of the studies made by their numerous successors in the same field.

Amongst these were the brothers Philippi, who made important researches in the geology and natural history of the Atacama desert and of the southern districts of the republic. Claude Gay has studied the physical and political history of the country, embodying the observations made by geographers, in a work of encyclopædic dimensions The geologist Domeyko, the geodesian Moesta, the astronomer Gilliss, have on their part added much by their special memoirs to our knowledge of Chili, which has also been visited and described by numerous travellers.

In general, the maps of Chili have been prepared with more accuracy and in fuller detail than those of any other South American State. In 1848 Aimé Pissis had already begun his works of triangulation, which were continued for sixteen years, and which enabled him to draw a map to the scale of $\frac{1}{250000}$, comprising over ten degrees of latitude from Caldera on the former Bolivian frontier to the Rio Cauten (Imperial) south of Araucania, that is to say, the most populous section of the country, in which are situated all the seaports, the mines and railways.

This first and necessarily defective essay at a topographical chart has since been greatly improved by surveys of the central region, and is being completed from year to year in the northern districts lately detached from Peru and Bolivia, and towards the south in the Magellanic archipelagoes.

In 1875 the Chilian hydrographic bureau began to issue the charts of the seaboard, and the national navigators now co-operate with those of Europe and the United States in extending and completing the surveys of those coastlands. In 1882 the *Romanche* landed at Orange Bay, not far from Cape Horn, a group of French naturalists, for the purpose of observing the transit of Venus. The occasion was utilised to take more accurate surveys of the labyrinth of surrounding straits and fiords, and to study the natural history and ethnology of this insular region.

II.

Physical Features.

Throughout its entire length, from the Peruvian frontier to the southern extremity of the continent, and even to the terminal headland of Cape Horn, Chili is occupied by the great chain of the Andes, which here develops one or more lateral ridges. The system is interrupted only towards its south end by straits and fiords, or by now dry marine inlets.

North of Tacna, the Cordillera, which rises above the plains some sixty miles from the sea, begins to bend round parallel with the coast. But the igneous rocks of Peru also penetrate into Chili, where eruptive cones dominate the broad pediment formed by the escarpment of the plateau. Candarave or Totupaca (15,750 feet), which sends its running waters in one direction to the Pacific, in another to the Bolivian Rio Maure, still emits vapours, while its fumerolles deposit enormous quantities of sulphur in its crater.

The Northern Highlands.

Other mountains of volcanic origin are clothed with snows which feed the headstreams of the Rio Tacna and of the Maure, chief affluent of the Desaguadero. Tacora (19,750 feet), dominant cone of this group, and the neighbouring Chipicani, both snow-clad peaks, stand on the north side of the much-frequented Guailillas or Huailillas Pass (13,750 feet). The crest of the water-parting, 1,000 feet lower down, commands a view of the isolated Sahama (Sajama) cone, whose smoking crest rises 21,000 feet in Bolivian territory, while within the Chilian frontier smoky Pomarapé scarcely falls more than 500 feet lower. Farther south, Parinacota (20,930) is separated by Lake Chungarra from the ridge above which Gualatieri (Huallatiri) rises to a height of 19,700 feet. Farther south, Isluya (17,000), according to native report, is frequently the scene of underground rumblings.

In this region the Andes ramifies into two distinct ranges enclosing shallow basins probably of lacustrine origin, which generally bear the name of *pampas*. The Huasco and Chacarilla pampas stand at the respective altitudes of 12,635 and 12,670 feet. Above the east side of the encircling heights rise the snowy Iquima (20,275 feet) and Toroni (21,340).

The western chain culminating in the Tata Yachura and Yabricoya, both about 17,000 feet, falls east of Iquique, developing an extremely regular plateau at a mean elevation of 13,650 feet, which from its resemblance to a "table" bears the name of *mesa*. It serves as an outer terrace to the eastern chain, that is, the true Cordillera, which here takes the name of Sierra de Sililica, and where occur the highest peaks, as well as still active craters. Tua, Chalo (Chela), Olca, Miño, ranging from 16,400 to 17,400 feet, and Ollagua (19,330), all emit vapours or discharge lavas, and are flanked on the west side by the San Pedro volcano rising above a lateral ridge.

All these cones are disposed in irregular order to the right and left of the normal axis of the system, while Aucasquilucha (Aucaquilcha), the loftiest summit in this section of the Andes (20,260 feet) stands quite apart, raising its isolated dome above the saline wastes in Bolivian territory. None have been ascended, or even seen near enough to permit of accurate measurements, except Ollagua, whose crater was reached in 1880 by the engineer, Hans Berger, engaged in the construction of the Antofagasta-Huanchaca railway. The present crater, which lies 1,150 feet below the highest peaks, is not of the normal circular form, but comprises a number of fissures and cavities, from which escape white wreaths of aqueous and sulphurous vapours accompanied by hissing and rumbling sounds. Clear yellow crystals are deposited round all the apertures. Round the cone are seen traces of glaciers with their semi-circular moraines, showing that the climate was formerly more humid, as in the Cordillera generally.

South of Ollagua the main range, in which are comprised all the igneous vents, at first trends regularly north and south, then bends round south-westwards to its junction with the West Andean chain under the latitude of Copiapo. Above the pedestal of the chief cordillera rise the domes or pyramids of at least thirty extinct volcanoes, all exceeding 16,400 feet in altitude. Atacama, Licancaur, Toconado, Hlascar, Tumisa, Socaira, follow at short distances, and are flanked on the right by the Antopalla group (20,920), and on the west by Socompoz (19,620), Guanaquero, and Llullaillaco (21,670). These, also, despite their great altitude and easy access, are little known, and Licancaur alone has been ascended to within 1,300 feet of the summit by Steinmann, who found traces of habitations up to the point reached by him.

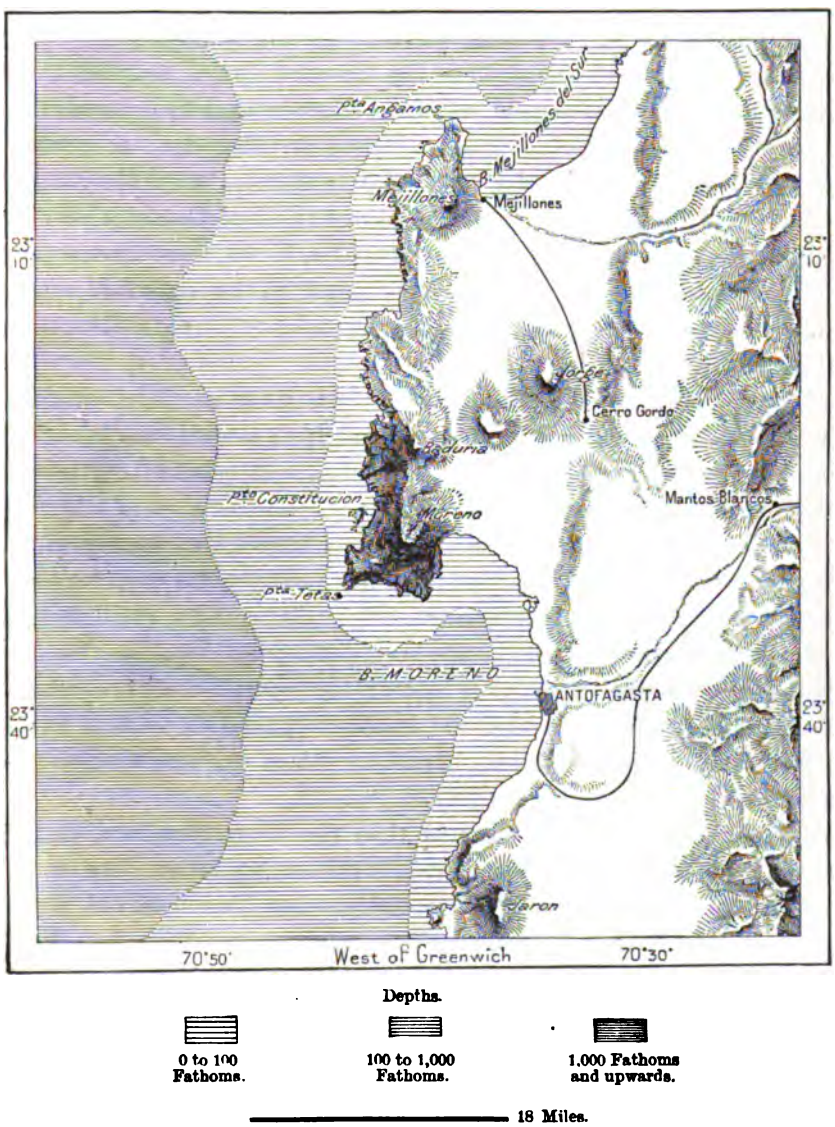
The whole of the Atacama region is occupied by parallel ranges disposed mostly north and south, but also throwing off irregular spurs and foothills of considerable elevation. Even in the vicinity of the coast heights occur exceeding 6,500 feet, and here Trigo rises to 8,780 feet, while the Cerro Negro farther inland east of Antofagasta attains 10,970 feet. The Caracoles or "Shell" Mountains, so called from their fossil ammonites, also exceed 10,000.

The Mejillones Range.

Beyond the normal coast-line has been developed the steep rampart of the Mejillones Chain, whose bold southern headland rises 4,150 feet above the Jorge

Fig. 153.—Mejillones Chain

Scale 1 : 900,000.



or Chimba Bay. The plain connecting this inlet with that of Mejillones at the north end of the range is evidently a marine bed upheaved at a comparatively recent epoch. The lowest strata resting on the hard rock contain thick silicious layers, a species of tripolite, composed almost entirely of the remains of marine

organisms, such as infusoria, urchins and corals. Above follow shell sandstones, gypsum, and beds of native salt, succeeded on the surface by sands covered with shell mounds, the remains of mussels and other species resembling those still living in the neighbouring waters.

The Chilian Andes Proper.

Juncal (17,530 feet) and towards the south-west Doña Iñez (18,245) are the first great summits of the Andean Cordillera within the former limits of Chili. A little farther south is the converging point of the various Atacama, Bolivian and Argentine ranges, and here cease the old lacustrine depressions, which occupy vast level spaces between the different sierras. Owing to their moister climate these uplands have been far more eroded than those farther north; the cirques, combes and valleys have been more deeply excavated, and consequently present, at least on the southern slope facing the Argentine plains, terraced escarpments assuming the aspect of mountain ranges. Thus are formed on the south side such groups of summits as the Cerro Azul, the Cerro Pintado, the Negro Muerto and the Cerro Bravo.

The narrow territory of Chili proper, excluding the recent northern annexations, is disposed in three parallel zones running from north to south with varying breadth: the Andean Cordillera, the coast range, and between the two a longitudinal depression, interrupted at intervals in the northern regions by transverse ridges. In South Chili the intervening valley, although extremely sinuous, and in certain districts narrowed to a sort of gorge between the opposite slopes, still remains an open plain with a gradual incline. Towards the south it is studded with lakes, beyond which it falls to sea-level, developing a vast marine basin half lake, half gulf. Farther on the plain assumes the form of a strait, and here a long line of channels stretches between the insular Magellanic groups (a continuation of the coast range) and the Andean Cordillera, whose southern extremity plunges into deep water.

The coast range is far less elevated than the inner cordillera, and in some places even falls below the transverse ridges connecting it with the main chain, although on both sides a certain correspondence has been observed between the respective altitudes. East of Quillota, Valparaiso and Santiago, between 32° and 34° south latitude, rise the culminating peaks of the Chilian Andes, and under the same latitudes also occur the loftiest summits of the coast range.

Of the two cordilleras the highest is not geographically the oldest. The coast range, formed chiefly of heights with gently-rounded contour lines and undulating crests, consists of granites and other crystalline rocks in the northern and central provinces, and in the south of mica schists, while tertiary strata, locally called *cancaguas*, abut on the seaward slope against the primitive crystalline nucleus.

The islands forming a southern continuation of the coast range belong to the same archæan and paleozoic horizons. On the other hand, the more recent

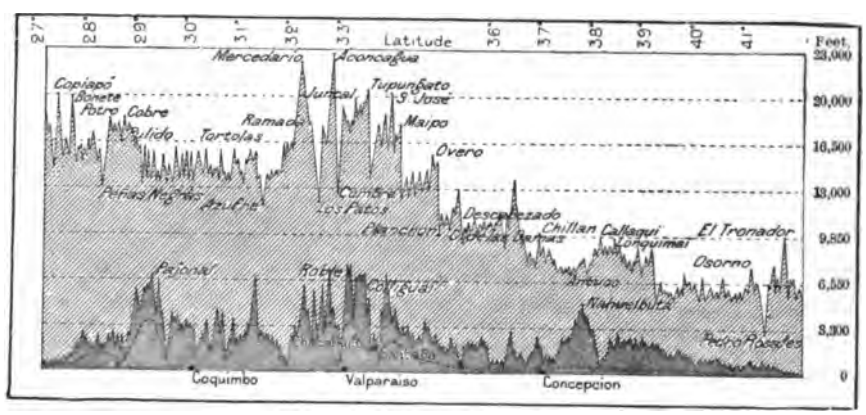
cordillera of the Andes consists chiefly of metamorphic porphyries dating from the secondary period, and elsewhere represented by limestones, marls and sandstones. Volcanic rocks, such as trachytes and modern lavas, have also cropped out in many parts of the primitive formations.

The longitudinal valley comprised between the two mountain ranges is covered with lacustrine strata deposited in tertiary times, and in their composition resembling the formations of the Atacama desert and those traversed by the Desaguadero of Lake Titicaca. They consist of sandstones and clays, covered with a layer of rocks and gravels rolled down from the Andes by the torrents and avalanches. Here fossils are rare, although some traces of vegetation are met, while the remains of the Andean mastodon occur in the alluvia filling the cavities of the surface gravels.

The central knot, where converge the Atacama, Bolivian and Argentine branches, is dominated by the so-called "volcano" of Copiapo, 19,700 feet high.

Fig. 154.—Parallel Cordilleras of the Chilian Andes.

Scale 1 : 16,500,000.



310 Miles.

The name is so far justified that vast deposits of sulphur are found in the vicinity of the mountain. South of Copiapo the Argento-Chilian cordillera expands to a broad plateau, where the range presents but a slight relative altitude, and is crossed by low passes; which, however, are difficult to surmount owing to the long spaces swept by biting winds and fierce storms. One of the most frequented of these passes, connecting the Argentine mining regions of Famatina with those of Copiapo in Chili, is the Portezuelo de Come Caballos, "Horse-Eater's Pass," 14,530 feet high. Other tracks cross the Andes farther south at the Pulido and Pircas Negras passes.

In these regions the mass of the cordillera consists of yellowish earthy heights rolling away without apparent order, and marked with a few patches of snow. The bleak "pampas of the cordillera" are very dangerous to cross in the winter months from May to November, and especially at the turn of the seasons, owing

to the sudden fierce squalls followed by intense cold in an exposed region offering scarcely the shelter of a rocky ledge to the benighted wayfarer. But in summer these deserts are crossed by hundreds of the Catamarca and Rioja muleteers, the best in Argentina, with droves of horses and mules for sale in the mining districts of Chili.

South of the Cerro del Cobre the cordillera presents the same general aspect. Here one of the lateral ridges branching off from the Andes, at the Tres Cruces, (15,324 feet) forms the transverse Doña Ana range, which terminates near the coast in the Pajonal group (6,720) between the Rios Huasco and Coquimbo valleys. Other transverse ridges follow southwards between the river basins, but all fall below the altitude of Pajonal.

In this part of its course the main range itself decreases in height, and here the Azufre Pass (11,960) falls some thousand feet below the other passes over the Chilian Andes. But it is relatively little frequented, owing to its oblique direction to the chain of the two fluvial valleys which here take their rise. Nowhere else does the crest of the Andes approach so near to the shores of the Pacific. A little south of the Azufre Pass the distance in a straight line is only 66 miles, and less than 23 to the alluvial plain through which winds the Illapel river.

Beyond the Illapel basin the cordillera, bending round to south by east, suddenly rises to altitudes equal to those of the great masses farther north. The Cerro del Mercedario even overtops Chimborazo, Huascan, Illimani and Sahama. According to Pissis its enormous snowy dome towers 22,315 feet above the Argentino-Chilian frontier, but is surpassed by its southern neighbour, Aconcagua, monarch of the Andes, to which Güssfeldt assigns a height of 22,884 feet. Some of the summits which flank Mercedario on the south-east, and which Güssfeldt groups under the general name of Ramada, rise above 19,700 feet.

Aconcagua—The Cumbre—Juncal.

Although distant over 90 miles from the coast, Aconcagua is visible from the Pacific, and is often seen standing out against a clear sky, disencumbered of its cloudy mantle. Being surrounded by numerous rugged spurs, and everywhere furrowed by winding gorges, Aconcagua is of difficult access, although its upper section for a total height of about 6,500 feet rises in a superb cone above the elevated pediment of the surrounding uplands. A broad snowfield, intersected by crevasses, is developed round the western and north-western slopes, but presents no great obstacle to the climber, nor would the higher and almost snowless escarpments be difficult to scale, but for the rarefied atmosphere and sudden snowstorms. In 1885, Güssfeldt first attempted the ascent, but could get no farther than 21,540 feet, or 1,340 below the summit.

Aconcagua is often wrongly described by the Chilians as a volcano; it consists of porphyritic rocks without any traces of crater, lavas or scoriæ. It is separated from Ramada by a breach famous in the history of Chili, the Boquete de Valle Hermoso (11,700), called also De los Patos, from the Argentine river of that

name ("Duck River"), towards which the Valle Hermoso ("Fair Vale") is inclined. Few travellers venture to cross from one slope to the other by this

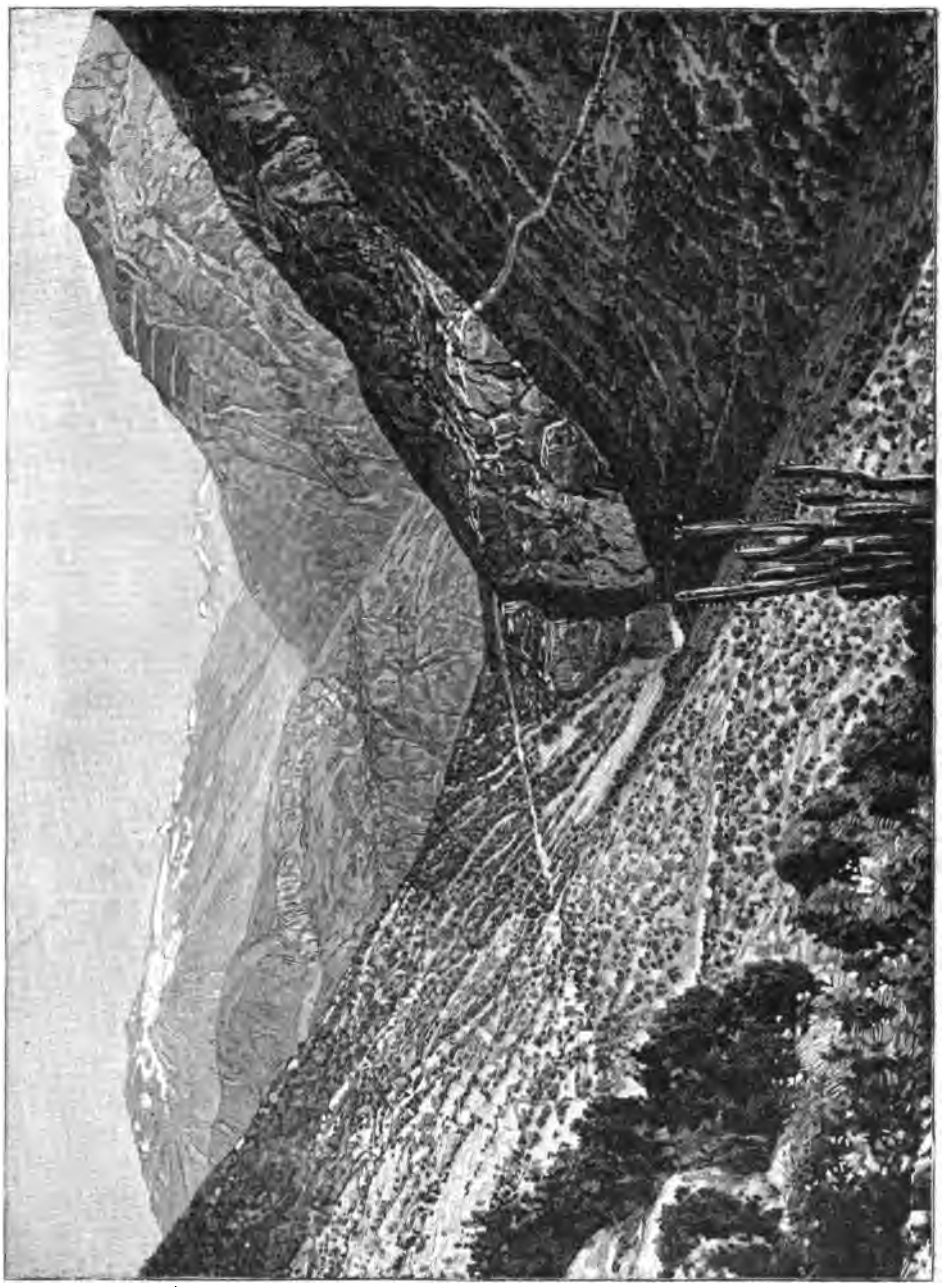


Fig. 155.—Ascent of the Cumbre—View taken from the Salto del Soldado.

difficult pass; nevertheless in 1817, General San Martin surmounted it with his whole army to outflank the Spanish forces, which were expecting him farther south at the Cumbre Pass. Thanks to this movement the Republican troops were able to

give battle on a field chosen by themselves, and thus gained the first great victory over the Royalists which brought about the independence of Chili.

The pass which is followed by nearly all travellers, and which is to be crossed

Fig. 156.—Aconcagua and La Cumbre.

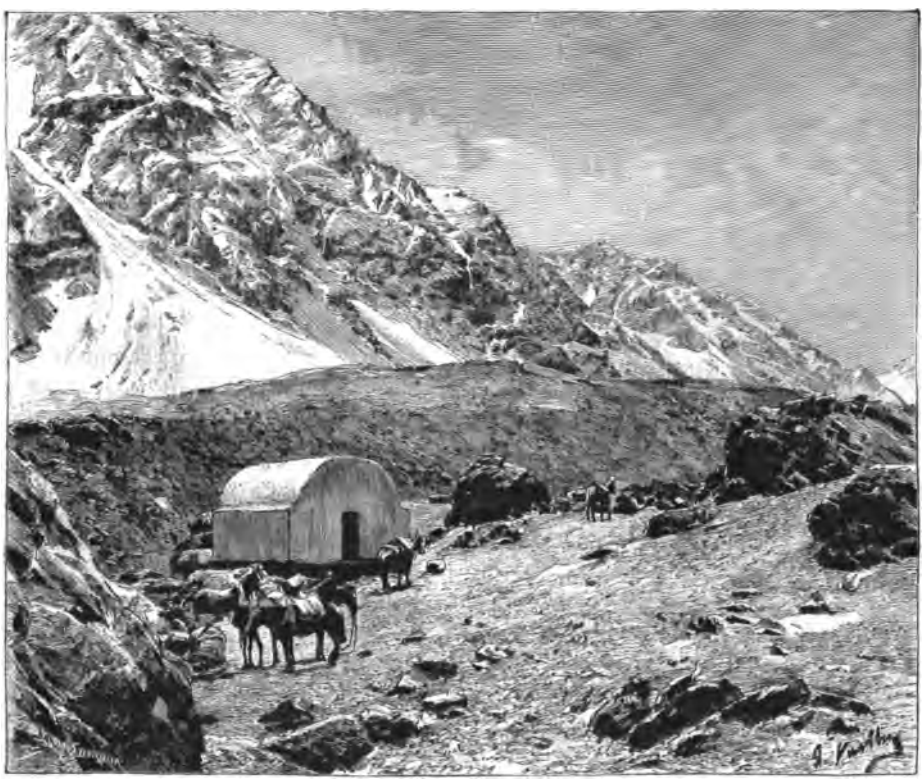
Scale 1 : 450,000.

by a railway before the end of the century, lies south of Aconcagua, but bears no special name, being simply called the Cumbre, or "Summit." It, however, occasionally takes the name of the Argentine town of Uspallata, and is also some-

times called the Cumbre Iglesia, to distinguish it from another 500 feet higher, which lies farther south, and which couriers often follow in winter because free from snow. According to Güssfeldt, the lowest and most frequented pass, where the railway tunnel is to be cut, stands at an elevation of 12,340 feet. A number of *casuchas*, or shelters, where the navvies keep their tools, and where the wayfarers take refuge from snowstorms, have been constructed at intervals along the route, which is not difficult, rising in a series of terraces to the highest point.

Above the border range between the Chilian slope and the Cuyo, the "Argentine Piedmont," rises Mount Juncal (a name common enough in Chilian

Fig. 157.—Casucha del Portillo, on the Cumbre.



geographical nomenclature), which, although falling below 19,700 feet, is important as the knot whence a lateral ridge ramifies west and north-west to the Chacabuco Pass (4,220 feet). Here is the northern limit of the great longitudinal plain of Chili, where is situated Santiago, capital of the republic.

South of Juncal follows snowy Tupungato, a mountain of volcanic origin 20,286 feet high. At its southern base lies the Portillo de los Piuquenes Pass (13,780 feet), so named from the species of herbage clothing the flanks of the neighbouring hills and the shores of a lakelet on the Chilian slope. It also takes

the name of Portezuelo San José, from the extinct San José volcano (20,020 feet), rising to the south, with an enormous breached crater facing west. In 1843 an earthquake overthrew one of the neighbouring heights, filling the valley with a chaos of rocks for a space of "over three leagues."

Maipo (17,670 feet) seems, like San José, to be extinct, nor is there any record or tradition of its disturbances. The crater, two miles round and filled with snow, inclines eastwards at a height of 6,560 feet above Lake Diamante, one of the chief sources of the Argentine river of like name. From the summit, scaled by Güssfeldt in 1883, the gaze sweeps over a range of heights, grayish on the Chilian, black on the Argentine side, flecked with snow and scored by short glaciers.

Overo—Tinguirairica.

Eastwards a cordillera disposed parallel with the dividing line of crests, but 4,900 feet lower, stretches north and south in Argentine territory. At the southern foot of the cone the frontier is crossed by the Maipo Pass (11,400 feet) at a scarcely perceptible incline, whereas farther south the more elevated Atravesio de la Leña Pass, as it is called by Güssfeldt, forms a narrow ridge with steep approaches on both sides. From this gap a view is commanded of the Overo volcano (15,550 feet), in Argentine territory, a mass of black lavas and grey ashes, with a glacier descending obliquely down its flanks.

In these regions the snowfields present peculiar forms known by the name of *nieve penitente*, "penitent snow," so called from the eccentric resemblance to cowled "friars penitent" affected by the frozen masses under the action of sun and wind. The crystalline parts, which resist evaporation and the melting process, ramify in the strangest fashion, in many places leaving the black ground exposed between the fantastic blocks of ice which sometimes stand five or six feet high.

Under the same latitude as the Overo volcano, but far within the Chilian frontier, Güssfeldt discovered a wonderful glacier descending in a lateral valley parallel with the main range down to the zone of cultivated land and human habitations. In 1882 the Los Cipreses torrent, to which it gives rise between the Agua de la Vida and Agua de la Muerte sources, had its head at the level of 6,260 feet, and the natives show a block 5,840 feet high, which thirty years previously was reached by the front of the glacier.

Beyond Tinguirairica (14,700 feet), which has been quiescent throughout the historic period, the main cordillera is continued southwards by Las Damas and by Peteroa (11,925 feet), which is said to have ejected lavas or ashes in 1762, and again in 1837. The Las Damas Pass has received its name from the astronomer Souillac, who visited these districts in 1805, and reported that the mountain might be quite easily crossed even by "ladies" The Planchon Pass stands at an elevation of 9,915 feet on the flanks of Peteroa, and was frequently followed by the marauding Indians, who formerly carried off the cattle of the Argentine farmers and sold them on the Chilian markets. Many engineers have proposed

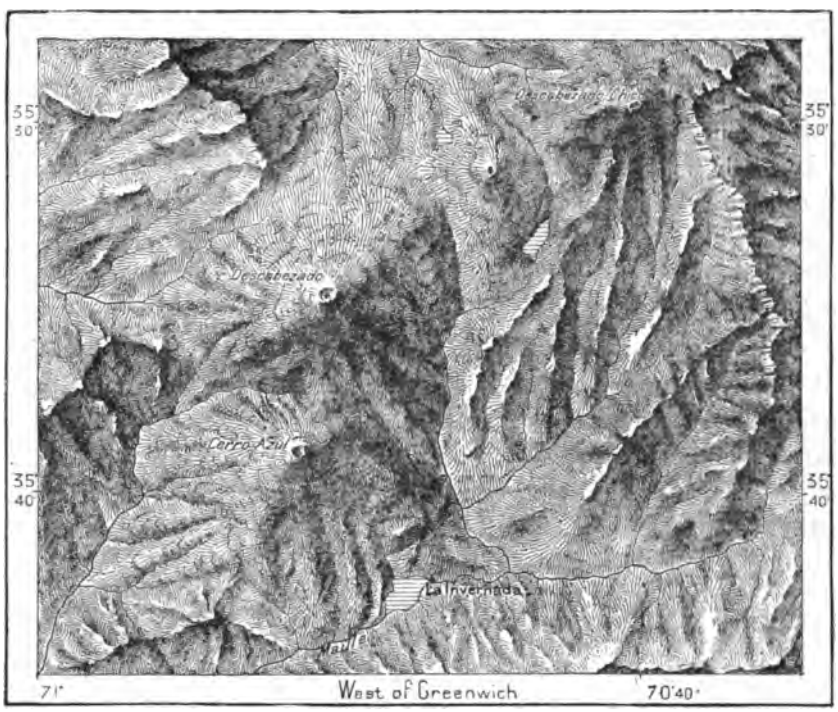
it as the most convenient for a road and a railway, its latitude being about the same as that of Buenos Ayres.

Descabezado—Antuco.

The numerous volcanoes which are grouped round the Descabezado, or "Decapitated" (12,760 feet), although at present quiescent, show evidences of former eruptions. They lie entirely within the Chilian frontier in the Maule river basin, which is fed by their snows, their little glaciers and lakelets dotted over the

Fig. 158.—Volcanic Descabezado Group.

Scale 1 : 870,000.



upland valleys. The isolated Las Yeguas volcano (11,350 feet), which has also been extinct from time immemorial, stands in the same basin west of the main range. The crest is covered with snow like the Cerro de Campanario (11,050 feet), and the neighbouring Nevado de Longavi (10,520).

Here the transition to a colder climate is already perceptible in the wintry aspect of the mountains with their zones of snow and ice. Farther south, between 36° and 37° south latitude, the Nevado de Chillan rises to a height of probably 10,000 feet, and sends down its southern and eastern slopes a considerable glacier, which has never melted even during the most violent eruptions. The winter

snows alternate in many places with layers of ashes, and trenches made in the snowfields have revealed a regular succession of such alternating layers spread over a wide space.

Chillan terminates in four peaks—the Old, the Red, the White and the Black, from which the lava floods have poured down a distance of 25 miles. During the four years between 1861 and 1865 it was in a continuous state of eruption, ejecting scoriæ in all directions. An avalanche of slush dammed up the Chillan torrent, and the fish of the running waters were killed by the vaporous acids. Thermal springs of diverse composition, fumerolles and solfataras, have made their appearance on the flanks of the mountain.

The Antuco volcano, nearly of the same height as the Nevado de Chillan (9,000 feet), rises some 60 miles farther south, also within Chilian territory, but separated from the Argentine frontier only by a narrow longitudinal valley flooded by Lake Laja. From the wooded shores of this basin descends the river of like name, which is one of the main branches of the Biobio. During the historic period Antuco has almost incessantly given some signs of life, were it only a few wreaths of vapour disappearing in the blue sky; but tradition speaks of no catastrophe caused by its eruptions.

The volcanoes following farther south, Trilope, Callaqui, Lonquimai, Llaima or Imperial, all falling below 10,000 feet, appear to be extinct, or at least quiescent. This section of the cordillera is crossed by easy passes, such as that of Antuco, just south of the volcano of like name, which, according to Domeyko, is only 6,890 feet high, and which has at all times been frequented by the Indians. Its slopes are not very steep, nor are they snowclad throughout the year, so that this would seem to be the natural route to be followed by a railway between South Chili and the flourishing district of Bahia Blanca in Argentina. Another route has been proposed over the depression in the crest south of Llaima, which has been called the Paso de los Andes, the "Andean Pass" in a pre-eminent sense.

The Southern Chilian Andes.

East of the southern provinces of Chili proper the main range maintains about the same average altitude of from 8,000 to 10,000 feet. Here the Villarica volcano, which has been in flames several times since 1640, and which still emits some luminous vapours at night, rises to a height of 9,320 feet. Riñihue and Puyehue (Puntiagudo) also exceed the snow-line, which in these latitudes falls as low as 5,000 feet. Osorno, a perfectly regular cone which was the scene of slight disturbances in 1839 and 1869, falls below 7,550 feet, while the so-called Calbuco "volcano," south of Lake Llanquihue, appears never to have had a crater.

In this land of transition between continental Chili and the coast region of Magellanic fiords, the culminating point is Tronador, the "Thunderer" (9,790 feet), so named not from its volcanic explosions, but from the avalanches of snow and ice crashing down to the valleys. North of this mountain some Germans, settled

in south Chili, discovered in 1856 a track leading over the cordillera directly to the Nahuel-Huapi, "Tiger Lake," a magnificent sheet of water whence flows one of the main branches of the Rio Negro. The *Boquete de Perez Rosales*, as this pass is called, is said to be only 2,760 feet high. In the last century the Jesuit missionaries were already acquainted with the passes near the Tronador, for they had a station on the Argentine slope in an island of Nahuel-Huapi.

South of this depression follows another forming an eastern continuation of the narrow Reloncavi fiord, the first occurring south of continental Chili. The dull green vegetation clothing its rugged walls imparts a savage aspect to this wild mountain gorge.

In the vast bend, exceeding twelve degrees of latitude, which the Andean cordillera describes south of the Tronador, the system nowhere offers any altitudes comparable to those of the northern and central sections. The Yate or Yebcan volcano rises 6,970 feet above Reloncavi Bay, while the more southerly Hornopiren, ascended in 1872 by the botanist Downtown, falls as low as 5,280 feet. Minchinmavida or Chayapiren, again rises to 7,946 feet, and this is followed by Chana, Corcovado and Millimoia (Melimoyu), all about the same height.

In Magdalena Island, Motalat (Mentalat) falls to 5,450 feet, although its base fills the whole island, which is enclosed by a circular trough like the moat of a castle. A subsidence of a few hundred years would suffice to transform all the coast mountains to so many islands, like Motalat, for they form not so much a chain properly so called, as a system of isolated cones disposed in a line.

These unexplored mountains are supposed to be volcanoes, although neither history nor tradition knows of any eruptions. Darwin alone states that Minchinmavida emitted flames in 1835. San Valentin, the highest peak yet measured in this part of the cordillera, attains 12,720 feet; it stands at the neck of the Taytao Peninsula, and appears greatly to exceed most of the surrounding summits, which on the marine charts fall below 8,200 feet.

But if the Magellanic crests do not constitute a very elevated range, they present an imposing aspect in their bold escarpments, the variety of the clear waters in which they are mirrored, the wealth and bright foliage of their woodlands, the dazzling white snows congealed to glaciers in their upland glens and gorges. Every summit has its native name imposed by the Patagonian Tehuelches; but these names having mostly been forgotten, many peaks have been designated from such explorers and observers as Fitzroy, Stokes, Payne, Burney and Ladrilleros.

The continental backbone terminates in the bold headland of Cape Froward, at the foot of which the Atlantic and Pacific sections of Magellan Strait intermingle their waters.

The Chilian Coast Range.

The Chilian coast range does not become clearly distinct from the Andean cordillera till about the latitude of the Chacabuco Hills, between Santiago and

Valparaiso. This ridge, consisting of hard rocks and here and there very steep walls, presents numerous easy passes, all valleys or gorges through which the old lakes of the inland plain escaped seawards. Colliguai, one of its crests south-east of Valparaiso, attains a height of 7,320 feet. But farther south none of the

Fig. 159.—Chiloe.

Scale 1 : 1,800,000.

Depths.

0 to 50 Fathoms.

50 Fathoms and upwards.

30 Miles.

summits reach this elevation, and even the main chain, the granitic Nahuelbuta, "Great Tiger," which runs parallel with the coast in the territory of the Araucanians, falls below 5,000 feet. Farther south, the Cordillera Pelada and other coast ridges, consisting of mica schists and cancagua, that is tertiary sandstones

containing lignite, have only an average height of 2,000 feet, the loftiest summit rising to no more than 2,824 feet.

On the seaward slope these hills present a dreary monotonous aspect with their bare flanks and round arid crests. Several bear distinct traces of terrace formations, which are regarded by Darwin, Pöppig, and other observers as old marine beaches successively levelled by the action of the sea. Indications occur of the presence of the oceanic waters some hundreds of yards above the present sea-level, caused either by an upheaval of the land or a subsidence of the Pacific. Oscillations of level seem to be also indicated by the shell mounds of relatively recent origin covering certain terraces and consisting of species identical with those still living in the neighbouring waters.

But the successive stages noticed on the flank of the mountains at the issue of the fluvial valleys are not necessarily of marine origin. Such terraces may be the result of the work of erosion accomplished by the inland streams in eating their way through the hilly rampart separating them from the sea. The recent shell mounds also may perhaps be nothing more than kitchen-middens accumulated by the coast populations. The indigenous Araucanians, Chilotes and Chonos were accustomed to dig long pits on the shore and to fill them with edible shell-fish, which they covered with hot stones, sods and earth, and remains of such *curantos*, or primitive fireplaces, occur everywhere.

But however this be, the upheaval does not appear to have been general. In one of the Chonos Islands Philibert Germain would even appear to have discovered evidences of the opposite movement of subsidence, indicated by a partly-submerged wooded shore.

Another question much discussed by geologists concerns the sudden abrupt changes of level said to have taken place on this part of the Chilian seaboard. The most violent earthquakes recorded in Chili were those of the years 1822, 1835 and 1837 along the shores of Conception Bay, under the same latitude as the Chillan and Antuco volcanoes. According to the unanimous statement of the inhabitants reported by Maria Graham, the shock of 1822 resulted in a general upheaval of the whole of the Valparaiso coast, or a subsidence of the sea for a space of about 60 miles. In 1835 Fitzroy and Darwin found evidence of such a change in Conception Bay, where the difference of level was as much as 5 feet at the town itself, while the neighbouring island of Santa Maria would appear to have been tilted up 8 or 9 feet at its southern, and 10 at its northern extremity. Altogether the upward thrust would have raised above the surface a mass of land equal in weight to about 363,000,000 pyramids such as that of Cheops, largest of the great monuments at Gizeh. But the old level was gradually re-established, and in four months all trace of the sudden rise had disappeared.

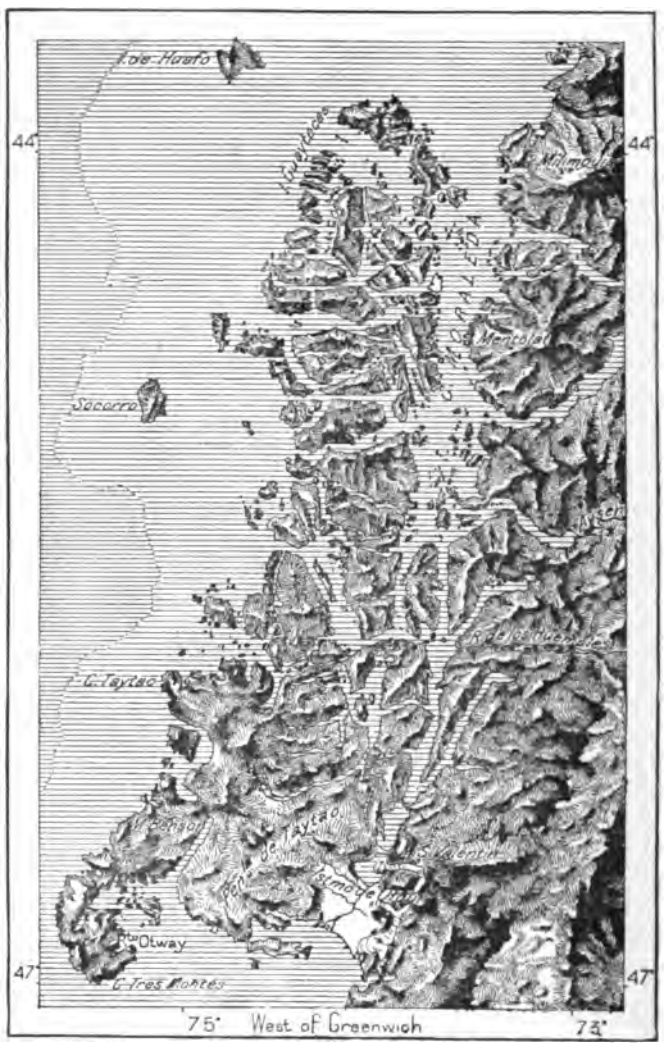
Chiloe and Neighbouring Archipelagoes.

Beyond the extreme promontory at Reloncavi Bay, the seaboard is continued southwards by the island of Chiloe, formerly Chili-hue, that is, "Part of Chili."

From the sea may be seen the broad gulf penetrating inland, but not the narrow Chacao strait or "channel" separating the island from the southern peninsula of Llanquihue. Like the neighbouring mainland, Chiloe presents its steepest

Fig. 160.—Chonos Archipelago.

Scale 1 : 3,000,000.



escarpments towards the west, these escarpments being the continuation of the coast range with steep hills 2,000 and even 2,300 feet high. But the culminating point is reached by a peak 3,200 feet high at the southern extremity of the island.

The ground slopes gradually eastwards, that is, towards the southern prolongation of the longitudinal depression of Chili, and the gulf is studded with islands and islets, like the hills scattered over the plains round about Valparaiso. As many as 120 of these islands have been counted in the Chiloe Archipelago. But far more numerous are those of the more southerly Chonos Archipelago, which is sub-divided into secondary groups by a labyrinth of straits and channels. On the marine charts are figured over a thousand distinct islands of all sizes. But a general survey of all these separate masses shows that, together with the Taytao

Fig. 161.—San Rafael Lake.

Scale 1 : 800,000.

Peninsula projecting from the mainland farther south, they form a vast peninsular region broken into fragments and separated from the Patagonian seaboard by the Moraleda Channel. Viewed from north to south it presents the aspect of a ruined embankment about 220 miles long and some 60 miles broad at its base. But the isthmus connecting Taytao with the mainland consists of two narrow alluvial strips enclosing the circular lacustrine depression of Lake San Rafael. Taytao culminates in the Cerro Encinas, 4,000 feet high.

Lake San Rafael presents one of the most remarkable spectacles on the Chilian

seaboard. A glacier descending from the spurs of the neighbouring Mount San Valentin penetrates far into the interior of the lacustrine basin, its sparkling surface offering a striking contrast to the dark cliffs of the rocky gorge through which it falls a height of over 300 feet down to the lake. Here it glides along the bottom at a depth of over 650 feet, until broken into fragments by the upward thrust caused by its greater relative buoyancy in the denser waters of the reservoir. An incessant thunder produced by the crash of the yielding blocks is re-echoed from the surrounding cliffs, while the tempanos, or icebergs, some as much as 100 feet high, drift away with the current setting towards the Rio de los Tempanos. Through this emissary they float northwards down to the Elephant Gulf, where the fresh water of the melting masses mingles with the marine floods.

The bed of the lake is steadily silting up with the deposits of shingle and glacial muds, which are brought down from the uplands, and which have already created the Isthmus of Ofqui, enclosing the lake on the south side. A much larger glacier than that of the lacustrine basin descends from the same heights to the southern part of the isthmus, which is traversed by the sluggish Rio San Tadeo, draining these moist alluvial plains southwards to the Gulf of San Estevan. The discovery of this curious glacial region is due to the missionary Garcia, who in 1766 passed from one gulf to the other by the Ofqui Isthmus, which might easily be pierced by a navigable canal.

Wellington and Southern Groups.

South of the Taytao Peninsula, which curves round south-westwards like a crab's claw, the sea is clear of islands for a distance of about 60 miles. Beyond the break the insular system again begins under various names, nearly all taken by the English Admiralty surveyors from British celebrities. First comes the group of Wellington Islands, separated from the Magellanic mainland by the Messier Channel, and farther on by a narrow passage winding like a river, and in some places, especially the English Narrows, contracting to a width of 300 or 400 feet. At Saumarez Island a superb prospect is presented by the steep granite and schistose cliffs, where the ships glide along the base of lofty mountains washed by tides swift as impetuous rivers.

A peak 3,840 feet high, at the southern extremity of the Archipelago, has received the name of "The Cathedral," from its dome, belfries and turrets, carved by the hand of time, and decorated by the falling moss with white lines, cornices and parapets. The recent German expedition of the *Albatross* and that of the Chilian hydrographer Serrano, have decomposed the Archipelago into several separate groups, which were formerly regarded as forming the single large island of Wellington. A navigable inner channel was also discovered, far less dangerous than the Messier passage.

All the more recent explorations in the insular groups farther south—Madre de Dios, Duke of York, Hanover, Queen Adelaide—have similarly increased the number of known islands studding the inlets which wind amidst the mountains.

CAPE PILLAR.

Some of the headlands which are now taken for peninsulas may also turn out to be islands. In all these fiords the water is very deep, deeper even than the open seas in the neighbourhood, and this depth itself constitutes a danger for storm-tossed vessels, which have great difficulty in finding safe anchorage under the shelter of the leeward shores. Simpson measured from 70 to 160 fathoms in the Moraleda Channel, east of the Chonos group.

Tierra del Fuego.

Despite the endless diversity of ramifying contour-lines presented by the inner labyrinth of fiords, Tierra del Fuego itself is connected with the other Magellanic lands by an outer curve of singular beauty. This archipelago begins at the western entrance of Magellan Strait with the surf-beaten headland of Cape Pillar (1,755 feet). The long spear-shaped island of which it forms a part has been well named a "Land of Desolation," recalling at the southern extremity of the New World that other "Land of Desolation" which lies at its northern extremity.

Then follow Santa Iñez and Clarence, with their suite of clustering islets, and lastly the great triangular mass, some 20,000 square miles in extent, the Land of Fire, at the extremity of the continent. The expression, *Tierra de Humos*, "Smoke Land," given by Magellan to this great island, would certainly be far more appropriate than the "Fire Land," said to have been suggested by Charles V. remarking that "there is no smoke without fire."* The smoke which the illustrious navigator saw at a distance curling up on the plains, and which was doubtless intended to signal the approach of strange beings in great ships, must have harmonised well with the stern and dreary scenery of those cheerless shores washed by waves of the polar seas.

Fuegia and its dependent islands offer within narrow limits a succession of diverse zones following from east to west in the South American waters. The western and southern sections, which merge in the archipelagoes of the extreme south, belong to the Cordillera of the Andes. They bristle with steep snow-clad summits, which send down glaciers to the surrounding valleys, and which project seawards in long serrated headlands, with ramifying inlets and deep fiords.

One of the first mountains in the Andean region of Tierra del Fuego (King Charles South Land) is the superb Sarmiento (6,630 feet), clothed to about an eighth of its altitude with a zone of sombre woodlands and covered higher up with vast snowfields, filling the upland valleys with winding glaciers. Although most of the rocks of this region may be of igneous origin, Sarmiento is certainly not a volcanic cone, nor is even the rock of which it is composed of plutonic origin. "Whether its real form be that of a tower, or that of a ridge with precipitous sides seen in profile, no volcanic rocks elsewhere in the world can retain slopes so nearly approaching to the vertical. It is, I believe, a portion of the original rock skeleton that formed the axis of the Andean chain during the long ages that

* Popper, *Boletin del Instituto Geográfico Argentino*, 1887, viii.

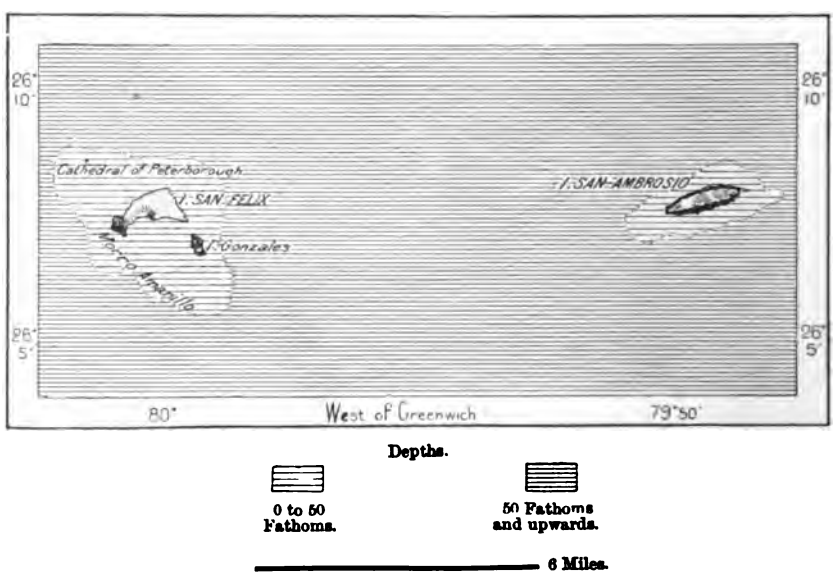
preceded the great volcanic outbursts that have covered over the framework of the western side of South America."*

But whatever its origin, few other mountains impress the mind so deeply with a sense of wonder and awe as this "Matterhorn of Fuegia," sole sovereign of the Antarctic solitudes. "As seen from the north, the eastern and western faces are almost equally precipitous, and the broad top is jagged by sharp teeth, of which the two outermost present summits of apparently equal height. At a distance of about 25 miles the whole mass seemed to be coated with snow and ice, save where some sharp ridges and teeth of black rock stood out against the sky" (*ibid.*).

The name of another illustrious explorer is commemorated in the Darwin range, which skirts the north side of Beagle Channel, terminating in Mount

Fig. 162.—San Felix and San Ambrosio Isles.

Scale 1 : 275,000.



Français (7,055 feet) near the Argentine frontier. Beyond the frontier the chain decreases in height, Mount Cornu falling to 4,334 feet, while the "Three Brothers," at the south-eastern extremity of the continent, scarcely exceeds 1,640 feet. But in Staten Island the Andean system again develops more precipitous scarps and higher summits.

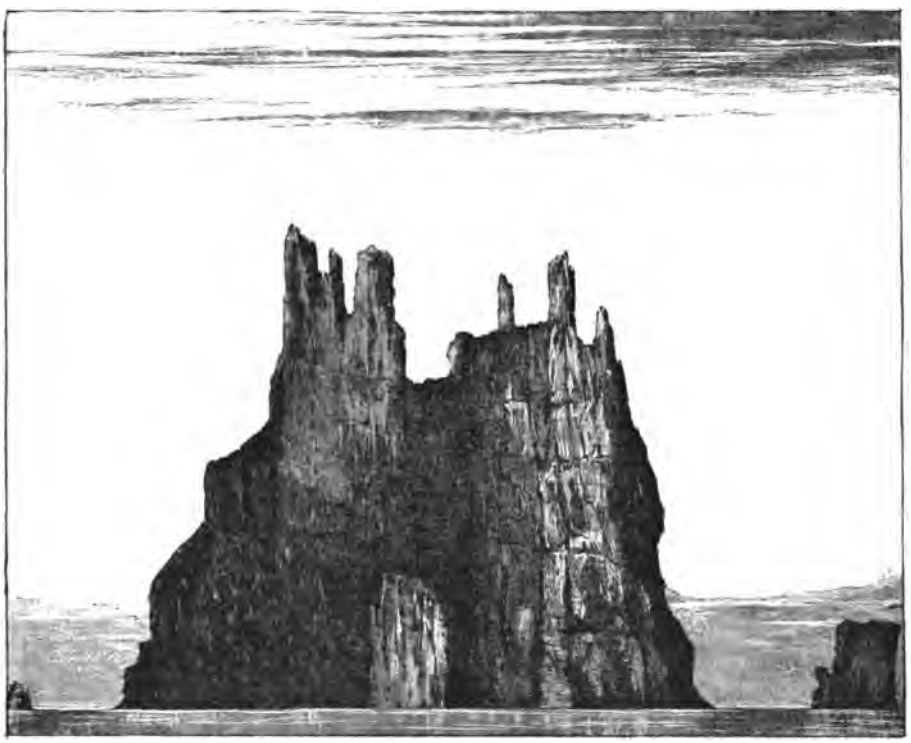
North of the outer crystalline range a hilly inner zone, densely clad with evergreen forest growths, is followed north and west by an intermediate strip of grassy parklands, beyond which all the rest of King Charles South Land between the Atlantic and Magellan Strait east and west presents a vast plain of tertiary formation, a sort of Patagonia in miniature, destitute of a single shrub. This dreary steppe terminates seawards in deeply ravined cliffs and elevated escarp-

* John Ball, *op. cit.*, p. 247.

ments incessantly attacked by the waves, which strew the shores of the inlets with their triturated fragments. Here the contrast between the Pacific and Atlantic seaboards is complete. While the former is broken by innumerable inlets, with endless channels, headlands and insular groups, the latter continues the regular concave curvature of the Patagonian shore-line with scarcely a break all the way from Magellan to Lemaire Strait.

The clusters of islands separated from Fuegia proper by Beagle Channel—Hoste, Navarin, the Wollaston archipelago and Cape Horn—belong entirely to the Andean system. They represent the summits of plateaux and mountains,

Fig. 163.—"Peterborough Cathedral."



whose base is deeply submerged in the waters of the Antarctic Ocean. The black headland of Cape Horn rises some 500 feet above the surface of these storm-tossed southern seas.

The San Ambrosio and Juan Fernandez Groups.

The oceanic lands politically dependent on Chili lie at far too great distances to be regarded as geological dependencies of the South American continent, from which they are separated by abysses some thousand fathoms deep. San Ambrosio, the northernmost group, discovered by Juan Fernandez, and by him called the *Islas Desventuradas*, "Strayed Islands," forms a rocky archipelago

of difficult access. The group culminates in a peak in the islet of San Ambrosio, 830 feet high. The Morro Amarilla, in the neighbouring San Felix, falls to 600 feet, while another rock, 174 feet high, has received from an English navigator the name of "Peterborough Cathedral" from the curious resemblance to that edifice presented by its two towers crowned with pinnacles, its pillars of columnar basalt and the deep porch-like recesses at its base.

The group of islets bearing the name of their discoverer, Juan Fernandez, have been known, like San Ambrosio, since 1574, when the Spanish navigator sighted them on his voyage from Peru to Chili. This little oceanic world consists of two islands and an islet. In the east rises Mas a Tierra, "Landward," prolonged towards the south by the insular Santa Clara; some 100 miles farther west is seen Mas a Fuera, "Seaward," which is completely isolated. Mas a Tierra, the larger of the two, and sometimes specially called Juan Fernandez, consists in reality of two distinct sections, one rather low in the south, the other much more elevated in the north-east. Towards the centre rises the pyramidal Yunque, "Anvil," whose peak (3,225 feet) stands out above the forest zone. Although smaller, Mas a Fuera rises more imposingly above the waters, its summit towering to a height of 6,170 feet.

Surrounded by a boundless expanse of water, and swept by high winds, the Juan Fernandez group receives an abundant rainfall. During the wet season, from about April to September, the northern and north-eastern gales prevail, bringing frequent downpours; but even in the summer season from October to March showers fall at night and morning, the weather clearing up in the afternoon.

Easter Island and Sala-y-Gomez, which have been occupied by Chili, are members of the Polynesian insular world.

III.

Hydrography of Chili.

The western slopes of the Chilian Andes approach too near the coast to allow space for the development of any large river basins. Most of the fluvial valleys themselves are disposed at right angles to the cordillera, and consequently reach the Pacific Ocean by the shortest and most rapid course. Under the rainless skies of the recently annexed Peruvian and Bolivian territories, and of the northern districts of Chili proper, the rivers are mere wadies, dry in their lower reaches, or even in the mountain gorges themselves. Farther south the watercourses assume more the aspect of torrents tumbling over cascades and rapids, and flowing in a more tranquil current only in the neighbourhood of the coast.

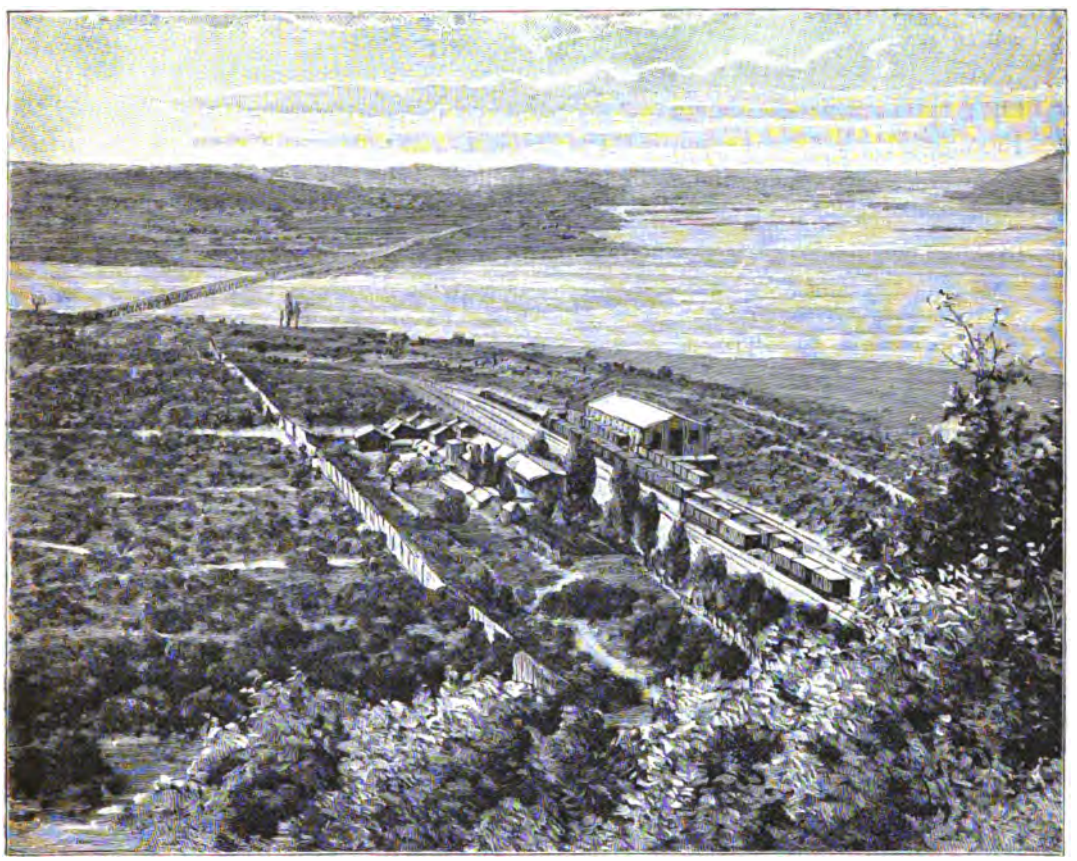
The Rios Sama, Loa, Aconcagua.

In the extreme north the so-called *rios*, whose sands are occasionally moistened by the melting snows, are known only as political or administrative

frontiers. Such is the Rio Sama, which since 1892 forms the boundary between Peru and Chili; the Rio Camarones, whose valley is still claimed by Peru; the Rio Loa, formerly the common frontier between Peru and Bolivia; the Rio Paposa, which before the treaty of 1883 formed the southern boundary of Bolivia.

Flowing beneath more humid skies, the Huasco is copious enough to reach the sea, from which, however, it is at times separated by a strip of sands. The Rio Coquimbo (river of Elqui), which is tapped by an irrigation canal, and the

Fig. 164.—Rio Laja and Biobio Confluence—View taken opposite San Rosendo.



Limari also struggle intermittently seawards. But the first two really permanent rivers of Chili are the Choapa and the Aconcagua, which are fed by the snows of the two loftiest mountains in South America. Farther south the Maipo, flowing well within the rainy zone, and receiving the contributions of the torrent descending from Santiago, assumes the character of a fully developed stream.

The Rapel, Maule and Cauten.

All the rivers following southwards as far as the Strait of Chacao continually increase their volume in proportion to the extent of their basins, a fact

due to the continual increase of the annual snow and rainfall in the same direction. Thus, despite their short course, the Rapel and the Mataquito are perennial streams, and the latter has to be crossed by ferry.

The Maule, which formerly marked the southern limit of the Inca empire, discharges a volume ten times larger than that of the Maipo. The Itata is equally copious, while the Biobio, whose basin includes a considerable part of the central plain comprised between the Andes and the coast range, has a discharge twice as large as that of the Maule. One of its tributaries, the Laja torrent, rises in the lake which nestles at the eastern foot of the Antuco volcano, whence it flows precipitously down to the plains. The cascades along the upper course of this stream are the finest in Chili.

The Rio Cauten, or Imperial, draining a much smaller area, has also a smaller volume, but at its mouth develops a considerable tidal estuary penetrating 15 miles inland. The Tolten, like all the other rivers of South Chili, is fed by the overflow of a lacustrine basin, Lake Villarica. The Valdivia, flowing from another flooded depression, broadens out in its lower reaches, where its numerous navigable channels are accessible to steamers.

The Bueno, Maullin and Palena.

The Rio Bueno, unfortunately obstructed by a difficult bar at its mouth, comprises within its basin three of the largest lakes in Chili—the vast island-studded Ranco, the Payehue and the Rubanco—the first of oval form, the other two developing their crescent-shaped contours in narrow valleys. Although exceeded by other Chilian rivers in the extent of its drainage area, the Bueno is the most copious of all, its volume being greater than that of several considerable French rivers, such as the Seine, the Somme or the Charente.

In the extreme south of Chili proper follows the Rio Maullin; which, however, is little more than the sluggish and marshy emissary of Llanquihue, largest of all the Chilian lakes. In all these rivers high and low water follow with the regularity of the seasons, rising in the winter months (June, July and August) under the influence of the rains, then subsiding continuously till midsummer (December and January), when they are again swollen by the melting snows.

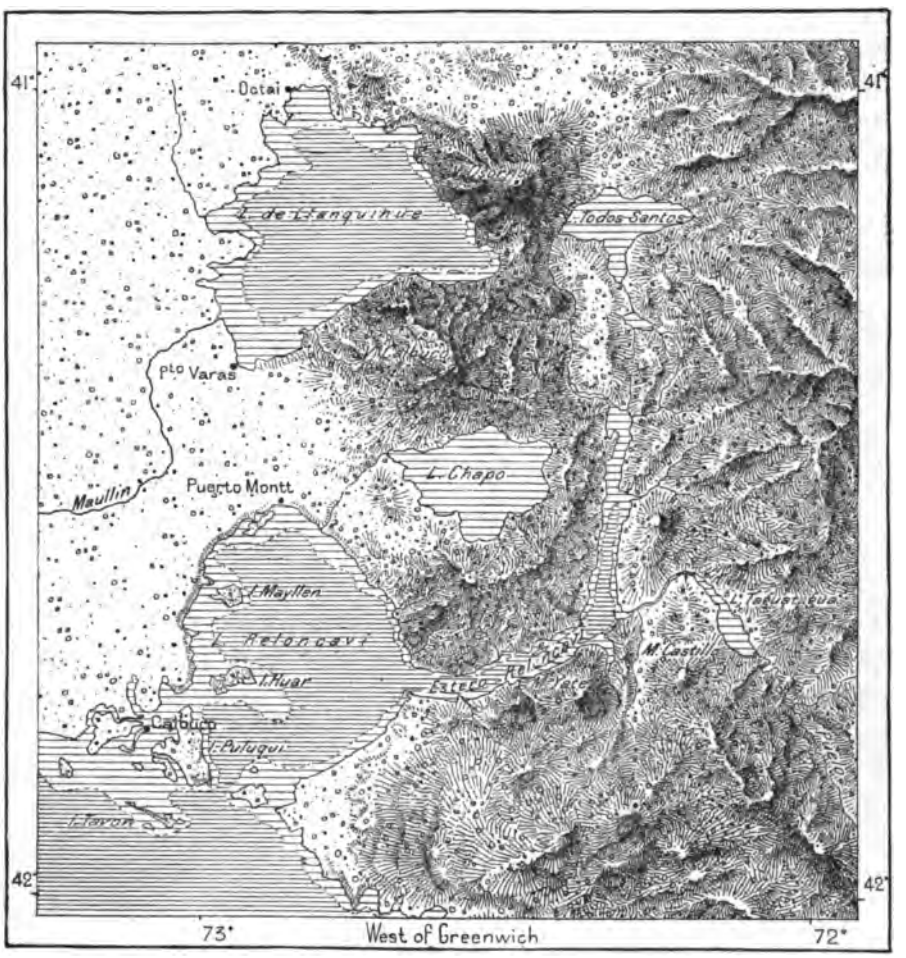
Farther south, in the Magellanic lands, a few rapid torrents rush down from the upland valleys of the cordillera, or else have their source in the glaciers. One, however, the Rio Palena, takes its rise on the eastern slope of the Andes, and forces its way seawards in deep gorges piercing the intervening ridges. Flowing south of the Corcovado volcano, the Palena debouches in the fiords over against the southern point of Chiloe. Inside the bar it may be navigated by boats for a long distance above its mouth. It traverses the fertile district long associated in legendary lore with the mythical city *de los Cesares*, or the *Ciudad Encantada*, that is, the Eldorado of the south continental regions. The rumblings which are occasionally heard in the mountain, and which are prob-

ably caused by the rush of avalanches, are attributed by the Indians to diabolical agency.

Two other still more copious rivers, the Aysen and Huemules, descend from the cordillera, but are supposed, like the Palena, to have their farthest sources in

Fig. 165.—Lakes of South Chili and Puerto Montt.

1 : 1,000,000.



the pampa beyond the mountains, that is, in Argentine territory. The Huemules has been ascended as far as a lateral glacier between pumice walls which are rapidly decomposed by the grinding action of the ice. The debris gets lodged in the crevasses, while a stream of blackish mud escapes from the crystalline mass.

The Chilian Lakes.

The lakes of North Chili, dried by the process of evaporation, have all been reduced to the condition of mere saltpans or morasses. Nevertheless, the old contour-lines may still be traced, while the lakes themselves are often conjured back by the mirage. Ascotan, Atacama and the other neighbouring lacustrine depressions have all been filled in by vast quantities of alluvial matter washed down from the cordillera. Shafts have been sunk in Salar del Carmen, east of Antofagasta, to a depth of 290 feet without reaching its rocky bed.

True lakes of pure water and abysmal depths are met only in South Chili at the foot of the glaciers, whose crystalline masses probably at one time filled these lacustrine basins. The Laguna Negra, near the sources of the Rio Maipo, has a depth of no less than 890 feet. Southwards the flooded depressions increase gradually in size and number as far as Lake Llanquihue and Reloncavi Bay, which itself appears to be also of lacustrine origin. All these sheets of water are extremely deep, and in Llanquihue the soundings have revealed depths of 360 feet near the shore. Rubanco, to which the name of its larger neighbour is often given, is partly fed by thermal springs. The low ridges of gravel which separate the Araucanian lakes, and through which the streams easily excavate a channel, appear to be composed of ancient moraines.*

IV.

Climate of Chili.

The long strip of Chilian territory presents every degree of transition between heat and cold, moisture and aridity. As a rule the isothermal line of temperature diminishes by about 1° Fahr. for every parallel of latitude in the direction from

* Table of the Chilian rivers according to the *Anuario hydrogrdfico* and other documents:—

Names.	Drainage area in square miles.	Length in miles.	Discharge in cubic feet per second.
Copiapo	4,300	155	0
Huasco	4,200	134	70
Elqui (Coquimbo)	3,500	90	70
Limari	2,600	96	106
Choapa	3,800	96	180
Aconcagua	3,560	160	355
Maipo	5,250	155	955
Rapel	6,570	134	9,215
Mataquito	2,680	166	3,510
Maule	8,000	140	9,785
Itata	4,400	108	6,360
Biobio	7,430	220	15,900
Cauten	5,000	200	6,185
Tolten	2,100	134	3,510
Valdivia	6,000	82	13,250
Bueno	7,200	150	18,000
Maullin	1,600	? 110	8,800
Palena	?	?	7,000 ?
Aysen	?	?	10,600 ?
Huemules	?	?	10,600 ?

north to south. On the other hand, it varies everywhere with the altitude, so that every district in Chili has its special climate.

Under equal latitudes the mean temperature on the west side of the New World is distinctly lower than on the east side, on an average about 6° Fahr. Hence a climate corresponding in Chili to that of Buenos Ayres in respect of its mean annual heat must be sought 9° of latitude farther north, that is to say, in the Atacama Desert.

In Chili the two extreme seasons, summer and winter, are clearly marked, and, speaking generally, all the inhabited part may be said to lie in the temperate zone south of the southern tropic. The central district between Santiago and Valparaiso is traversed by the 33rd degree of south latitude, and consequently lies in the heart of the temperate zone, where considerable contrasts occur between the different periods of the year. Thus at Valparaiso the mean summer temperature exceeds that of winter by about 11° Fahr. In South Chili, as, for instance, at Valdivia, the contrast is still more marked, and corresponds to the differences observed in West Europe.

With the alternations of heat and cold coincides a shifting of the aerial currents, for the persistent trade winds, being intercepted by the cordilleras, are not felt on the low-lying Chilian coastlands. By the physical conformation of the land, which is disposed in the direction from north to south, the atmospheric currents are compelled to take the same meridional direction, either from the pole towards the equator or from the equator towards the pole. In spring and summer the southern or polar winds are predominant; in winter the northern or equatorial prevail.

But when these general winds blow with less vigour, the aerial movements are limited to the play of the land and sea breezes, the former prevailing at night, the latter refreshing the atmosphere on the inland plains during the day. At times the *terrales*, as the land breezes are called, assume the character of *tramontanas*. Rising on the Argentine pampas east of the cordillera, they also take the name of *puelches*, which is the appellation given to the Patagonian tribes of the interior by the western Araucanians. These puelches usually coincide with the normal trade winds, the result being often somewhat analogous to that of the Pyrenean *autan*, or of the *vaudaire* and *foehn* of the Valais and the Grisons in the Swiss Alps. They are alternately hot and cold, and towards the end of summer, when they sweep down from the Andes over the southern plains of Chili after traversing the arid Argentine pampas, they bring a stifling atmosphere, which raises the normal temperature of the land 16° or 18° Fahr. At the end of winter and beginning of spring the reverse phenomenon takes place; at this period they arrive after traversing vast stretches of snowy wastes, and consequently lower the temperature by as many degrees as they had raised it six months previously.

Both North Chili proper and, still more, the lately-annexed Peruvian and Bolivian provinces fall within the rainless zone. For a distance of "about 600 miles (farther than from Liverpool to Oporto) there is no inhabited place, with the possible exception of Pisagua, where drinkable water is to be had. Nowhere in

the world is there such an extensive tract of coast so unfitted for the habitation of man."* Rain may be said never to fall in the Atacama Desert, where miners have passed long years without ever observing a single refreshing shower. So entirely is the absolute dryness of the climate depended upon that the old ravines formerly excavated by the running waters are now chosen as the most convenient tracks for the construction of railways. Thus the line from the port of Chañaral to the Salado mines follows the bed of the permanent or intermittent coast stream which now runs out in the sands some 30 miles from the sea.

In these regions the process of denudation and the weathering of the rocks cropping out above the surface is caused, not by the action of rain and snow, but mainly by the great oscillations of temperature between day and night. After exposure during the day to the continuous action of the solar rays, the rocks are rapidly cooled at night, when the glass falls from 70° to 90° Fahr. below the midday heat. They are thus subjected to alternating movements of expansion and contraction, which cause them to scale and crack in various ways according to their geological structure. Certain formations are decomposed in thin films like the leaves of a book; others break into concentric layers, scaling off like the bark of the plane-tree. Under the action of the air the felspar crystals are transformed to kaolin, and all this debris accumulates in earthy masses at the foot of the hills. The more compact nuclei, which offer a greater resistance to the atmospheric influences, assume the form of towers or obelisks rising above the surrounding plains, which are themselves thickly strewn with vast quantities of shingle, innumerable fragments of quartz, chalcedony, and other crystals.

The Chilian Nitrate-fields.

Pissis has advanced the hypothesis that the nitrate-fields, so extensive in the Atacama Desert, and farther north in the Pampa de Tamarugal, are also due to the same climatic conditions. But various theories have been proposed by Darwin, Forbes, Noller and others. At first it was supposed that the deposits originated in a chemical transformation of guano; but, if so, other substances should also be present which are absent. Nor have the nitrates their origin in the decomposition of the seaweed stranded on the beach, for in none of these beds have any marine shells been found. On the contrary, the nitrate is almost everywhere interspersed with small unrolled stones, not such shingle as we should expect to find in basins of pelasgic origin, separated from the sea by upheaval and dried by the process of evaporation.

Moreover, the nitrates, so far from occupying the beds of such lagoons, are usually disposed along the eastern slopes and in proximity to the crest of the coast range, far from all limestone formations and from all stratified rocks such as would have been deposited in marine waters. But it may be asked whether volcanic exhalations may not have transformed the salts assumed to have been originally precipitated in the old lacustrine depressions of the plateau. Pissis explains the

* John Ball, *op. cit.*, p. 123.

genesis of the nitrates by the disintegration of the felspar rocks exfoliating under the action of the air and changes of temperature, and then transformed to a substance containing kaolin, iron oxide, salts of lime and soda, which in their turn were changed to sodium chlorides and nitrates. But these slow chemical operations can take place only in waterless districts, for wherever the ground is washed by rains or streams the *caliche*, as the deposit is called, is always melted. Hence, large masses could be formed only on the margin of the basins farthest removed from the Sierra where the running waters had their source.

In the Pampa de Tamarugal, that is, of the "Tamarisks," the nitrate-fields cover a continuous area of about 500 square miles, with a varying thickness, which in some places exceeds 10 feet. According to the calculations of the engineer Smith, the total quantity of nitrates contained in the surface strata of the pampa amounted in 1860 to 65,000,000 tons. Moreover, the presence of extensive underground beds is revealed by numerous fissures in the surface of the ground, which cross each other in all directions. Thus are formed countless polygonal figures covered with small stones, which give to the plain, viewed as a whole, the fantastical aspect of a mosaic pavement. The surface fissures themselves correspond with the underground fissures produced in the nitrate-beds reduced in volume by the crystallising process, and decomposed in prisms analogous to basalt columns. But even these spaces are as nothing to the saline efflorescences deposited by evaporation in the depressions of these arid regions—lacustrine basins of which nothing now remains except the salt.

Everywhere numerous traces are seen of the presence of water at a former epoch in these arid deserts. The running waters have left their deep beds, whose banks were fringed by a vegetation the remains of which still survive. In the mountainous district stretching between Iquique and Huantajaya explorers have discovered the presence of a vast half-buried forest, whose branches have worn with age, but whose huge stems still exist. As far as can be judged from their appearance, the trees belonged to a species which no longer flourishes either on the coastlands or on the plateau. They were changed to stone, say the Indians, by the god Pachacamac, in order to destroy the wicked generation that dwelt beneath their shade.

There are evidences of continuous desiccation even since the epoch of the Conquest. In certain now desert districts of Atacama are seen the remains of buildings which no one would now dream of erecting in places rendered absolutely uninhabitable by the absence of water. The very name of "San Fernando de la Selva" given to Copiapo attests plainly enough the presence of an ancient wood (*selva*) in a climate which is now far too dry for a forest vegetation. It appears also from numerous documents that the Rio Copiapo, at present dry in its lower course, formerly reached the sea. One of the gorges on the east even bears the name of *Quebrada Seca* ("Dry Ravine"), as if to distinguish it from the channel through which the river flowed seawards. The town of Totoral ("Rushgrove") perpetuates by its very name the memory of an old fen which still existed at the close of the Spanish rule.

As it approaches the equator, the south wind setting along the Chilian coast is gradually heated, and thus becomes proportionately drier, for heat raises the point of saturation—that is, increases the capacity for containing aqueous vapour. On the other hand, the northern winds become more moist by losing their high temperature, and the aqueous vapour is thus precipitated in the form of rain. On the coasts of Chili proper the proportion of rain water increases with the latitude. Thus the average number of wet or showery days rises from 1 at Copiapo, and 3 or 4 at Coquimbo, to 21 at Santiago and as many as 150 at Valdivia; the Maullin, meaning the "Rainy River," fully justifies its Indian name.

In the Magellanic archipelagoes it rains throughout the whole year, and in the Straits of Messier and Smyth, King recorded in 41 days a rainfall of over 120 inches. This superabundance of moisture, which in the upper atmospheric regions assumes the form of snow, explains the great development of the glacier. These frozen rivers reach right down to the sea under latitudes corresponding to regions of the northern hemisphere where winter snows are rare. Thus the San Rafael glacier lies under 46° 30′ south latitude, that is to say, it is as near the equator as the mouth of the Gironde below Bordeaux, while the lower limit of perpetual snow descends to the level of 4,000 feet on the flank of the mountain where it has its source. On the other hand, Aconcagua, less than 950 miles farther north, has been seen free of snow at altitudes of 18,000 or 20,000 feet.

Climate of Chiloe and Fuegia.

Even in Chiloe the moisture is excessive. In winter it rains incessantly, "six days in the week," say the natives, "and on the seventh the sky is overcast." In summer the vapoury veil lifts oftener, but even then a succession of a few bright days is a rare occurrence; the horizon remains cloudy and the forests and heights of the interior are shrouded in greyish mists. The annual rainfall, ranging from 80 to 100 inches, transforms the underwoods to morasses. Those engaged in clearing the forests for cultivation find it difficult to fire the trees, which rot as they stand and are blown down by every gale; few crops succeed, and on the dank soil the green corn grows mouldy in the ear.

The Magellanic land resembles Alaska, not only in the form of seaboard indented by a labyrinth of inlets, but also in its heavy downpours and its woodlands springing from a flooded soil. But thunderstorms are rare, although the tempests rage at times with fury. Magellan Strait is occasionally swept by sudden squalls from the lateral gorges, the *williwaws* of the English sailors, who compare them to avalanches.

According to the natives there is always a coincidence between the earthquakes and the torrential rains. At the same time the snows and glaciers on the slopes of the cordillera give an index to the mean temperature of the land, which may be determined by the level to which the frozen masses descend on the flanks of the mountains, as well as by the greater or less abundance of moisture, and the

number and magnitude of the crystalline streams discharging into the upland gorges or lower valleys.

Tierra del Fuego, forming a triangular mass projecting between the Atlantic and Pacific Oceans, has a special climate corresponding to these conditions. The advanced headlands present a rocky surf-beaten barrier to the cold polar current with its huge icebergs torn from the antarctic glaciers and lowering the temperature of the sea to about 39° or 40° Fahr. The larger portion of this current, averaging about 300 miles in breadth, follows the direction of the coast-line, first from south-east to north-west, and then from south to north. With a mean velocity of 28 miles a day, reduced in some places to less than 12, or even apparently neutralised by the north wind, the Humboldt current, as it is called, follows the coasts of Chili and Peru, beyond which it is merged westwards in the great equatorial current.

On reaching the submerged scarp of the terminal plateau of South America, this polar stream throws off to the right (east) a smaller branch, which, instead of following the Patagonian and Argentine seaboard, sets due east in the direction of the Cape of Good Hope. The deflection is due to the tepid waters of the Atlantic equatorial current flowing south-westwards to the extremity of the continent, and impinging upon the east branch of the Antarctic stream. According to Popper, the equatorial current maintains a temperature of 50° Fahr., with a daily velocity of over 200 miles in the Fuegian waters. Thus there is a difference of 10° Fahr. between the two streams setting along the shores of the archipelago in opposite directions, the Humboldt from south to north on the west, the equatorial from north to south on the east side. The result is a very marked contrast between the climates of the opposite shores of Fuegia.

The relatively cool atmosphere of the Pacific side, whose temperature is further lowered by the mountain snows and by the polar winds, descends rapidly in the direction of the east to replace the warmer and more rarefied air ascending into the higher regions above the eastern shores of the archipelago. Thus arises the fierce gale which sweeps the eastern plains of Fuegia, preventing the growth of a single tree on the bare steppe, whereas in the west leafy forest growths flourish under the shelter of the mountains in the glens unexposed to the boisterous winds.

The rainfall also diminishes gradually in the direction of the east. On the south-western slopes the wet days, according to Popper, rise to at least 300 in the year, whereas there are scarcely as many hours of rain at San Sebastian Bay on the Atlantic coast.*

* Meteorological conditions of some towns in Chili :—

Towns.	Latitude.	Summer Temperature.	Winter Temperature.	Mean Temperature.	Mean Rainfall. Inches.
Iquique	20° 23′	75° F.	59° F.	66° F.	0·5
Copiapo	27° 22′	67°	52°	60°	1·
Valparaiso	33° 1′	63°	51°	57°	14·
Santiago	33° 27′	65°	45°	54°	17·
Valdivia	39° 49′	61°	45°	52°	108·
Ancud	41° 46′	56°	46°	51°	94·
Punta Arenas	53° 10′	49°	36°	43°	23·

V.

Flora of Chili.

The influence of soil and climate is reflected in the vegetation of Chili. In most lands the flora increases in variety and splendour in the direction of the equator; but not so in Chili, where, although the temperature diminishes nominally from north to south, the moisture increases in the same direction, its influence more than compensating the waning heat. The beauty and variety of the forest growths also increase as far as 39° or 40° south latitude; here the Chilian woodlands display all their magnificence with the endless diversity of their lianas and parasitic plants.

But farther south the flora is impoverished under the action of the lowering temperature. Nevertheless, the arborescent vegetation, which is absent from the northern regions of Chili, ranges in the south down to Cape Horn. Nearly all the trees of the Chilian flora are evergreens, and this flora also contrasts with that of the northern hemisphere in the absence of extensive forests of a single species, such as the pine, fir or birch groves of Europe and Asia.

Vegetation of every kind disappears on the arid terraces and plateaux of Bolivian Chili, and on the saline Atacama plains, where the mules tethered about the enclosures gnaw away the green-painted palings, mistaking them for their mountain pastures. Here the aspect of the land "is absolutely that of the scenery of the moon, of a world without water and without an atmosphere."*

South of this dismal region the first plants to make their appearance are the cactuses, beyond which the monotonous scenery begins to be relieved by a few thorny or resinous shrubs, whose scant foliage offers but a slight surface of evaporation to the air. Towards Copiapo, where the arborescent vegetation commences, the inter-Andean plain still remains absolutely bare, the trees being entirely confined to the slopes of the Andes and of the coast range. Here the fogs and dews on one side, and on the other the rains and melting snows, supply sufficient moisture to nourish the woody species, which are intermingled with the cactuses and bromeliaceæ.

Farther south, the zone of scanty arborescent forms broadens out, and is followed by the region of groves and thickets. Here a few trees are seen even on the plain itself, while south of the Rio Aconcagua, which marks the climatic divide between North and South Chili, woodlands flourish spontaneously wherever they have not been cleared for tillage.

On the plains the most characteristic tree is the peumo (*cryptocarya peumus*), an evergreen whose foliage is impenetrable to the sun, and which yields little red berries with a resinous taste. A species of palm, the only member of the family in Chili, formerly abounded in this coast region for a space of about 220 miles between 32° and 35° south latitude. But, although rich in saccharine, it has been nearly exterminated by the planters, and will soon have to be sought in private

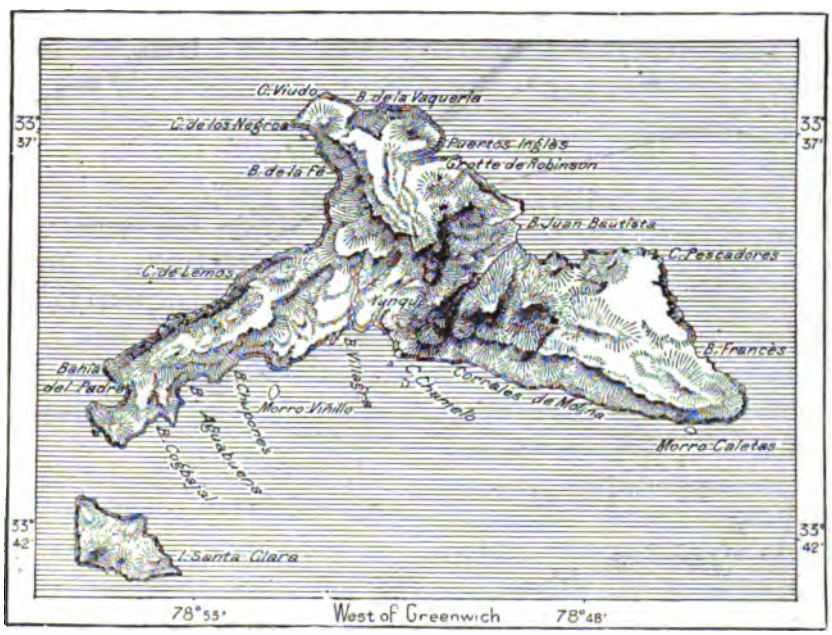
* John Ball, *op. cit.*, p. 130.

gardens and enclosures reserved for exotics. The bamboo is absent, but replaced by allied or analogous forms.

South of Cachapoal the beech and the so-called "cypress," distinct from the European genus, begin to present themselves in the forests, while on the slopes of the Araucanian mountains is seen the piñon (*araucaria imbricata*), one of the few fruit-trees possessed by Chili before the arrival of the Europeans. The Antarctic zone begins with the *Fitzroya patagonica*, wrongly called a "larch"; it occurs in the forests of Valdivia, but is confined to the mainland, being nowhere seen in the neighbouring archipelagoes. On the other hand, the cypress of Chiloe (*libocedrus*

Fig. 166.—Mas a Tierra, Eastern Member of the Juan Fernandez Group.

Scale 1: 175,000.



tetragona) had ranged as far as the Guaiteca Islands; but it had too little value to be spared by the woodman's axe, and has now nearly disappeared.

The pretended "oak," really a beech (*fagus dombeyi*), and various other varieties of this tree, forming a considerable part of the 69 species accredited to the indigenous flora, constitute, with the birch and an aromatic tree (*drimys winteri*) with foliage like that of the laurel, the great bulk of the forest vegetation in the Magellanic archipelagoes.

Of plants introduced from Europe and other regions, the most widely diffused are the oak, which grows more rapidly than in its native home; the poplar, in great request for the alamedas or avenues about the large towns; the eucalyptus, willow, chestnut, and apple tree, which now runs wild; lastly, the vine, wheat and other economic plants.

Some of these have also found their way to the Juan Fernandez group, where before the arrival of man the flora was essentially distinct from that of South America, presenting even a greater resemblance to that of New Zealand. Most of the species were found only on the island of Mas a Tierra, and amongst them was a palm unknown elsewhere, which was simply called *chonta*, the general name of all palms in the Quichua language. Nearly all the arborescent species in this island have aromatic properties. The sandalwood, which was supposed to have disappeared from the archipelago, still survives in some of the more secluded districts.

Fauna.

The Chilian fauna, in some respects less rich than its flora, comprises only a small number of mammals. The ape and even the jaguar are absent, and the vicuña is rare, except in the recently annexed northern provinces; but, on the other hand, the southern regions are roamed by large herds of the guanaco. The huemul (huelmul, guelmul, *cervus chilensis*), which figures on the Chilian escutcheon like the unicorn on the British arms, is not peculiar to the country; it is met also in the Peruvian Andes, where it has received the name of *cervus antinensis*. In Chili proper it is even very rare, though it abounds in the Magellanic lands. The pudu, another species of deer, and the smallest of the whole family, also inhabits the austral provinces. But the chinchilla dreads the cold, and ranges no farther south than 32° south latitude: it avoids the Andean uplands, and is seen only in the coast range and in the intermediate zone on the foothills of the Andes. Chili also possesses the coypu (*myopotamus coypus*), a rodent which corresponds to the North-American beaver, and which, like it, frequents the river banks.

Far more numerous than the mammals are the birds, which also present some highly original types. Several species are seen nowhere else, not even in Argentina, which is separated from Chili only by the Cordillera of the Andes. The condor, which in the equatorial Andes hovers only above the uplands, descends in Chili to the lower parts of the Andean slopes, and ranges southwards into Patagonia. Three or four species of humming-birds flit amidst the flowering plants of South Chili. Parrots also are seen in the woodlands as far south as Magellan Strait, as had already been noticed by Sarmiento in 1580.

All these birds, whose brilliant plumage seems a reflection of the fierce tropical solar rays, have adapted themselves to the fogs, the rains, and the dull grey skies of the Patagonian Andes. But taken as a whole, the avifauna of the watery archipelagoes comprises but few species, except as regards the seafowl.

The reptile order, which is somewhat numerously represented, presents a great difference of forms between the dry and the moist regions. In the Atacama Desert and in the Copiapo and Coquimbo districts the lizard family prevails, whereas frogs and toads are chiefly met in the marshy and peaty lands farther south. Chili possesses no representatives of the turtle family, although they are found in Argentina on the other side of the Andes. Nor are there any venomous snakes or insects, except a species of spider which keeps to the wheat-fields; its

bite is very dangerous in the hot harvest season. Reptiles are altogether absent in the humid southern islands.

In the Magellanic and Fuegian archipelagoes the insects present a remarkable affinity to those of North Europe; even the corresponding species occurring at the northern extremity of the New World diverge more from those of the extreme south than do the allied European types.

The running waters of Chili have scarcely any fish, and the Andean lakes none at all, but the neighbouring seas abound in animal life. Prodigious banks of mussels (*mytilus chorus*) encircle the Chonos islands. A seaweed (*macrocystis pyrifera*) growing to a length of 300 or 400 feet, in depths of 150 feet off the Magellanic coasts round the headlands and reefs, forms a distinct marine world inhabited by myriads of shellfish, animalcules and organisms of all sizes, which cling to its leathery bands, and by multitudes of fishes frequenting its mane-like branches. Floating masses of these algæ are strong enough to deaden the shock of a vessel going at full speed.

The Juan Fernandez group, which is distinguished by its indigenous flora, also possesses a fauna of an original character. Here are captured a species of cod different from that of Newfoundland, and a crayfish of huge size (*palinurus frontalis*), which are brought to the Valparaiso market. Sea otters, seals and "sea lions" abound in the surrounding waters. The larger island is inhabited by two species of humming-birds, one unknown elsewhere, the other found also in Chili; Mas a Fuera possesses a third species occurring nowhere else, either in the archipelago or on the mainland. These three humming-birds belong to the genus *eustephanus*, so surprisingly rich in differentiated forms.

VI.

Inhabitants of Chili.

When the Spaniards were led into the country by Almagro and Valdivia the Quichuas were masters of all the northern section as far as the river Maule. But they do not appear to have formed any colonies, but merely held military possession of the land, while striving to impose their laws and institutions on the inhabitants. In this they may perhaps have succeeded in some districts, for according to the local traditions their rule had already lasted a century, while their political system was everywhere distinguished by the success with which it was imposed on the conquered peoples.

On the other hand, the Quichuas came from such a remote region, which was, moreover, separated from Chili by lofty ranges and inhospitable wastes, that they could at no time have been very numerous in these southern lands. Nothing remains to recall their sojourn in the country except a few sculptures, amongst others the so-called *Piedra Pintada* in Atacama. This "Painted Rock" shows that the civilised invaders had reached Chili not only by the valleys of the Argentine Andes, but also by the direct routes across the desert plains of the seaboard.

But if few traces survive of the old Quichua masters of North Chili, abundant evidence has been found of the presence of their Aymara rivals. The Atacamas and the Lipez, who have left their names to parts of the plateau and of the arid coastlands, belonged to this ethnical stock. The Chungos, who live in the vicinity of Cobija, and whose fishing-nets are supported by floats made of inflated seal-skins, are also pure Aymaras. But in the oases of the desert, and farther south in all the coast districts where agriculture, mining and other industries have attracted a white population, the Indian type has been assimilated to that of the modern Chilians of Spanish speech.

The Calchaquis, from beyond the mountains, appear to have been formerly strongly represented amongst the coast peoples. The Huasco Valley, where the Indian race has been best preserved, and where are situated the towns of Vallenar and Freirina, still possesses a type quite distinct from that of the populations of European origin. It is marked by a dull brown complexion and features sharply chiselled in strong relief. In general these aborigines surpass the other Chilian populations in beauty, muscular vigour, dignified presence and graceful carriage.

The Araucanians.

At the arrival of Almagro the Chilian territory proper was occupied by a powerful people which had taken the name of *Molu-che*, "Warriors." From the Spaniards they received the designation of *Araucans* (*Araucanians*), a term which seems derived from the Quichua word *Aucaes*, "Rebels," uttered with a strong guttural sound. They had offered a stout resistance to the Quichuas, and they defended themselves no less valiantly against the Spaniards. Yet they did not constitute a nation in the proper sense, but were divided and subdivided into a large number of tribes, septs and clans, each independent and recognising no master. Every family group had its isolated habitation under the shade of some wide-branching tree, enlivened by the ripple of some babbling brook. No cacique had any authority in time of peace; no man owned any serf or slave subject to his pleasure; even the father did not presume to rebuke or chastise his son. There were no laws or any penal code, and the vendetta remained a private affair to be settled between the parties concerned.

Yet despite this absolute lack of legal or political cohesion, the Araucanians were merged in a single people the moment their independence was threatened. The family and tribal groups coalesced, and all rose as one man, electing their *toqui*, or war chiefs, and deposing them if lacking in vigour during a protracted struggle. Their forefathers, as they believed, watched them from the firmament, where they shone as stars moving along the Milky Way.

With the year 1550 began the long conflict with the Spaniards, who sought to gain a footing in Araucanian territory, and who belonged to that group of veterans who had achieved so many triumphs over less resolute foes. After the first defeats, due to their ignorance of the resources of the invaders, the Arau-

ARAUCANIAN CACIQUE AND HIS STAFF.

canians assumed the offensive, storming and razing the Spanish towns and strongholds, carrying off arms, cattle and horses, and even organising troops of cavalry to sweep down on the scattered bands of the enemy.

Reinforcements had frequently to be sent from Spain to protect the northern settlers from the Araucanian incursions, and to recover the towns founded in their territory. The Araucanian wars cost Spain more men than had fallen in the conquest of Mexico and Peru. Yet all the Araucanian warriors together formed an army less numerous than that by which Atahuallpa was surrounded when he was dragged from his throne by Pizarro in the public square at

Fig. 167.—Group of Araucanians.

Cajamarca. Hence the Spaniards themselves, who were good judges of valour, frankly acknowledged the prowess of their adversaries, and Alonzo de Ercilla's *Araucana*, the finest poem inspired by the discovery and conquest of the New World, written by a poet who had himself taken part in the war, was dedicated to the glory of the Indian warriors.

Three generations were consumed in the struggle, yet after over a century of incessant strife, the victory remained with the natives. By the treaty of 1641, confirmed in 1655, the representatives of Spain solemnly recognised the independence of the valiant Araucanians, these engaging on their part to allow no enemy of Spain to land in their territory. They kept their word through

sheer distrust of all strangers, and persistently refused to aid the English or Dutch corsairs in their excursions against the Spanish main.

Originally the territory left them by the treaties was very extensive, occupying a space of about 30,000 square miles between the sea and the Andes, and stretching from Arauco Bay south to the Rio Calle-Calle (Valdivia). No other region was more suited by its soil and climate for European settlement; none more diversified by lovely scenery. Hence, although the wars have never been renewed, a peaceful forward movement has taken place, with the result that the Araucanians, nominally free, have practically lost their political autonomy.

They have made several partial attempts to recover their independence, and a French adventurer, originally a lawyer in a provincial town, even essayed some years ago to carve himself a kingdom and found a dynasty in Araucanian territory. But the supremacy of Chili had already been too firmly established for any such attempt to succeed. Her war-ships now command the seaboard, where ports have been opened and where troops may be landed at any moment. Towns have sprung up in the interior, and while these are connected by broad tracks through the forests, the railway steadily advances farther into the plain between the Andes and the coast range, thus dividing Araucania into two distinct sections. Nor have the natives themselves preserved their racial purity. During the old frontier wars they frequently carried off Spanish women, whose offspring approached the white type. At present the reverse process is going on; the Chilians intermarry with the Araucanians, and thus the race becomes more and more modified from year to year.

The old tribal divisions corresponded in no way with any family or racial differences, and were, in fact, of a purely territorial character. Thus the Picunche were the "North Men," whose southern boundary was formed by the Rio Maule; the Pehuen-che, most numerous of all, and ancestors of the present Araucanians, inhabited the district of *Pehuen*, that is, of the Araucanian plant; the Huilli-che, or "South Men," occupied all the rest of the Chilian mainland; while the Puel-che, or "East Men," beyond the Andes, dwelt in territory now included in Argentina.

The Chiloe group had also its Araucanians, the Cunchos and the Payos, whose Hispanified descendants have received the general name of Chilotes. The peoples dwelling on the banks of the lakes and rivers call themselves Lubu-che (Levu-che), that is, "Water Men." The Chonos Archipelago recalls an Araucanian people of that name, of whom only a single family was still surviving in one of the Guaitecas islands in 1871. Some mummies found on one of the insular headlands show that the Chonos buried their dead in the same way as did the Quichuas.

Collectively the Araucanians may have originally numbered about 100,000; but they were greatly reduced during the wars, and still more by the process of assimilation with the half-caste nation of Spanish speech. At present they are estimated at not more than 40,000. Although living in comfort—owners of land and livestock—they continue to decrease, their power of resisting epidemics being

greatly inferior to that of Europeans. They yield especially to small-pox, and to dysentery, and their constitution is sapped by the alcoholic liquors fabricated by the neighbouring settlers.

In general of stout build, but without any great muscular development, they are much shorter than the kindred Patagonians. The young men, who being accustomed to the saddle make excellent grooms, have round soft features without prominent bones, hence of a somewhat feminine cast. But the cheekbones grow with years, the large nose acquires strength, and the expression assumes that dignity and gravity which is so often combined with a gentle disposition. The complexion, mostly a pale yellow, is lighter than that of the Quichuas.

Their sonorous language, spoken with a measured utterance, is admirably suited for oratorical display, so highly valued by this warlike people. Some words of Quichua origin show that, although never reduced by the northern invaders, they had received some of their civilisation from them, notably the art of reckoning and a knowledge of various industrial processes. The acquisitive faculty is strongly developed, and they are already scarcely inferior to their Chilian teachers as husbandmen and stock-breeders. The *chuera* or *linao*, one of the national games, closely resembles the English game of cricket.

Those Araucanians who still keep aloof in their upland valleys worship, or rather dread, the evil spirit *Quecubu*, whose wrath or malevolence they seek to conjure by the intercession of the wizards. They do not believe in final extinction after death, and accordingly deposit with the departed those objects which they most valued in life. Till recently even horses were sacrificed on their graves; but all these practices are gradually yielding to the laws of inheritance. Like the Quichuas in pre-Columbian times, they bury the dead seated, the knees bent back to the breast. Like all the surrounding aborigines, they treat their women well, although the universal practice of polygamy enables the wealthy to purchase several wives, so that none remain for the poor. This is one of the causes of the rapid decrease of the Araucanian race.

The Fuegians.

The Onas (Aona, Yacana), the Gente Grande ("Big People") of the Spaniards, who are scattered in small groups over the large eastern island of Tierra del Fuego (King Charles South Land), are undoubtedly Patagonians, like those of the Argentine mainland. But they must have migrated at a somewhat remote period into their new homes, certainly before the arrival of the Europeans, for they have no knowledge of the horse, whence their English name, "Foot Indians." Recently they were estimated at 1,000 or perhaps 2,000, all born hunters, who even chased the animals of the white settlers, being unable to understand how five or six shepherds could have need of as many thousand sheep all for themselves. Hence they are now hunted down in their turn by riders armed with rifles, who receive a "capitation grant" of £1 sterling for every Indian head.

If this system of reprisals is continued all must soon perish except the children and the young women employed about the farmsteads, who will be rapidly absorbed in the already half-caste Argentine settlers. The Onas resemble the Patagonian Tehuel-ches in height, appearance and pursuits, and like them, they live on the flesh of the guanaco, which they capture with bow and arrows. The languages are sufficiently near for the tribes to be mutually intelligible, but the Ona pronunciation is so harsh that Bridges compares it to the noise produced by a man gargling under difficulties.

Fig. 168.—Indigenous Populations of Chili.

Scale 1 : 37,000,000.

The only natives of Tierra del Fuego entitled to be called "Fuegians" in the sense of aborigines are the nomads who have their camping-grounds in the western and southern parts of the archipelago. There are two distinct groups, the western Alakalufs and the Southern Yahgans, the Tekenikas of the early writers, both probably descended from a primeval American race, who formerly peopled the whole of the continent south of the Amazons. Their small stature, averaging about 4 feet 6 inches, presents a striking contrast to that of the Ona descendants of the gigantic Patagonians.

They differ also in the form of the head, which is disproportionately large, and the face, which appears to be angular, and often of the lozenge type. The low narrow forehead surmounts small black eyes, usually well formed, but at times with oblique lids. The short, crushed nose, depressed at the root, terminates in very wide nostrils, and the mouth, usually very large, is a highly characteristic feature, with thick, pouting lips. The sonorous Yahgan language has 44 distinct sounds and, according to Bridges, a vocabulary of at least 30,000 words.*

The Yahgans, who constitute the most numerous section of the Fuegian race, have been wrongly described as cannibals by Fitzroy and Darwin. They eat neither the aged nor their enemies, as has been often asserted, and their chief food consists of shellfish, especially mussels, as shown by the huge shell-mounds in the vicinity of their camping-grounds. They wear no clothes beyond the skins of animals, thrown loosely

* This statement of the Rev. Mr. Bridges has been received with the utmost surprise by philologists, and must clearly rest on some strange misconception. Probably the endless changes in the Yahgan verb, due to the incorporating process of all polysynthetic languages, have been mistaken for separate words.—Ed.

ALAKALUF FUEGIANS, DRESSED IN HUANACO SKINS.

over the shoulders and shifted according to the direction of the wind. The explorers by whom they have been visited have collected no legends or any folklore regarding their origin and migrations, nor is there anything to show that they worship a Supreme Being. Nevertheless, they believe in a future life, and the unknown causes a sort of religious awe, for they speak of ghosts, who at times attack and devour the living.

The dead are either burned, or buried under the shell-mounds. There are no proper or family names, and in conversation they designate each other by the place they occupy, or by some other detail. They sing, or at least hum, incessantly repeating the same word or syllable; but they never dance. The social circle is, in fact, too fragmentary for any collective demonstrations, in which mutual sympathy and the æsthetic sense play such a large part.

Since the arrival of the English missionaries in the archipelago the mortality has been frightful, the natives having been more than decimated by typhoid, small-pox and consumption. Those patients, however, who escape from the stations and resume the savage life exposed to cold, wind and storms, have some chance of recovery.

The Alakalufs, who, according to Bridges, number only about 150 persons, formerly occupied a far more extensive territory than at present along the shores of Magellan Strait. They are the Pesherais of Bougainville, King and Fitzroy, being so called from a word which they have perpetually on their lips. Essentially a fishing folk, they build large skiffs, in which they venture on the high seas as far as the remotest islands of the archipelago in quest of seals and aquatic birds. They live chiefly on mussels and fish, although they also pursue the guanaco with bow and arrows.

Their language differs altogether from that of the Yahgans (Yamana, "Men"), southernmost of the American aborigines. But both groups lead the same existence, have the same appearance, and must be regarded as belonging to the same ethnical stock. They have often been described as scarcely belonging to humanity at all, as a sort of "primates" scarcely higher in the ascending scale than the ape, incapable even of development, or of being trained as the animal is trained. The contrary, however, has been proved by the efforts made by Mr. Bridges and other devoted missionaries to educate them. The Fuegians are assuredly human beings, and their destruction would be as much a crime as was that of the Tasmanians and of so many other primitive peoples exterminated by the whites.

The Chilians.

All these southern groups—Onas, Yahgans, Alakalufs—constitute but an infinitesimal section of the Chilian nation, in the formation of which the Araucanians, the Molu-ches and other northern aborigines have had a large share. The white invaders all took native wives, and Iñez Suarez, who arrived in 1541, was the first Spanish woman who settled in the colony. More Indian than

European by descent, but Spanish by their speech, the Chilians have a very marked personality amongst the South American populations. They are cooler and more collected than their fiery neighbours of the central and northern Andean regions, less impulsive but also more steadfast and tenacious of purpose. They often speak of themselves as the English of the southern continent, by contrast with the Peruvians, or rather the people of Lima, whom they assimilate to the French. They are described as reserved, harsh and even cruel, and in the last war with Peru, they certainly showed little pity for the vanquished.

While largely of Araucanian lineage, the Chilians are not even pure Castilians in speech, the Spanish language having undergone more changes in Chili than in any of the other Iberian colonies in the New World. The European Spaniard landing at Valparaiso cannot at first understand the current speech, not only because of some Araucanian terms introduced into the local dialect, but also owing to the habit the Chilians have of dropping the last syllables of the words.

VII.

Topography.

Tacna, till lately included in Peru, became the northernmost town of Chili in 1892. Lying no less than 1,260 miles to the north of Santiago, it differs greatly in the character of its inhabitants, who comprise a considerable negro element, from the urban groups of Chili proper. Standing at an altitude of about 1,870 feet, the town stretches along the banks of a stream whose bed is nearly always dry, being exhausted by the irrigation canals ramifying amid the surrounding gardens and orchards.

Before the construction of the railway between Mollendo and Puno, Tacna was the emporium for nearly all the produce and metals forwarded from La Paz and Oruro towards the Pacific. The *Tacora* pass, the approach to which was commanded by Tacna, served as the main outlet for the trade of Bolivia.

Arica—Pisagua.

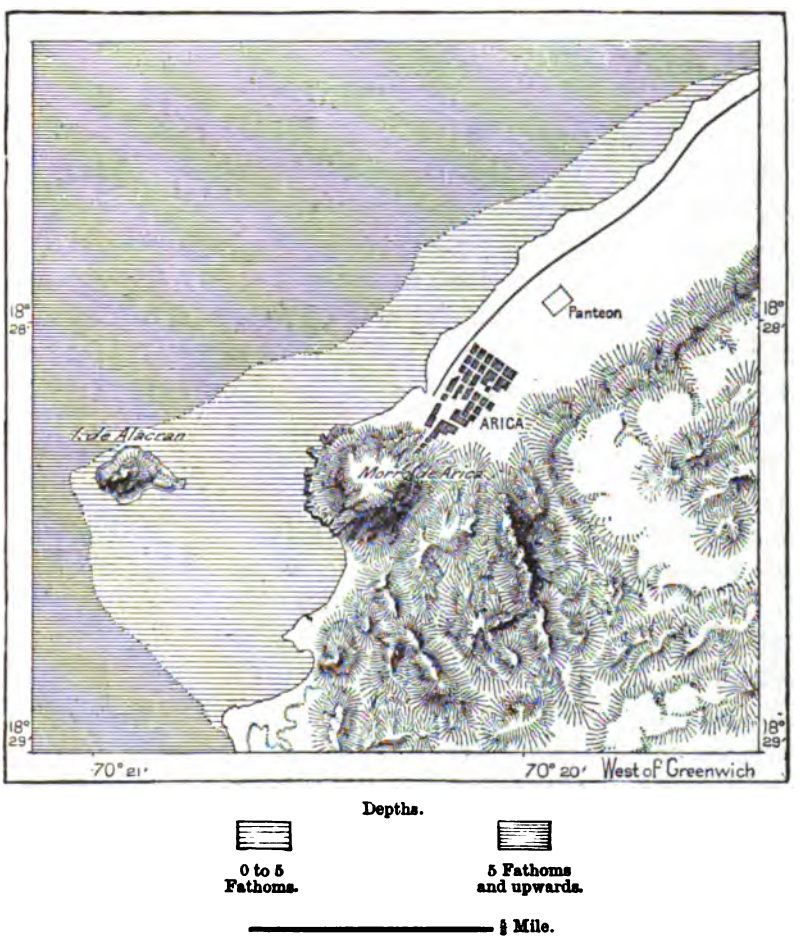
Arica, which lies on the coast near the point where the waterless bed of the Rio Lluta reaches the sea, occupies a position of great interest in the physical structure of the continent. In this district, at the intersection of the main axes of the Peruvian and Chilian Andes, frequent vibrations of the ground are caused by the subterranean disturbances. Occasionally the shocks are extremely violent, and Arica, which was destroyed in 1605, suffered much in the middle of the eighteenth century. The earthquakes of 1868 and 1877 were still more disastrous, because it had become a flourishing trading place. But so strongly built are the low houses that they run little risk of being overthrown, and the chief danger comes from the sea, which first retires, leaving the shipping stranded on the beach,

and then returns in a prodigious wave, rolling in with irresistible force, and sweeping away all obstacles. In 1868 it tore a frigate from its moorings, and hurled it to a distance of over a mile inland. Then in 1877 another wave bore it back to within half a mile of the sea, without drowning the numerous families that had taken up their abode in the hull.

These disasters have not prevented Arica from rising from its ruins. It occu-

Fig. 169.—Arica.

Scale 1 : 32,000.



pies too favourable a position at the natural issue of the Tacora pass to be neglected by vessels plying in these waters. Before the completion of the Arequipa and Antofagasta railways it was the chief *intermedio*, or port of call, between Valparaiso and Callao, and it still carries on a brisk export trade in Bolivian wools and metals.

The surrounding plain is a mere waste of sands and stones; but the village of *Lluta* in the north-east collects sufficient water in its river bed to grow a little

maize and lucerne. Formerly the district must have been far more thickly peopled, as is evident from the remains of buildings and of numerous tombs full of mummies, whose large yellow eyes are formed by the shells of a species of mollusc fished in the neighbouring waters.

Pisagua, Junin, Mejillones del Norte, Caleta Buena, Iquique and *Patillos*, all trading and industrial centres, almost without families, and peopled mainly by rude adventurers and dealers, follow along the coast in the direction from north to south. All owe their origin or their prosperity to the development of the industries connected with the export trade in the nitrates and other chemical substances mined in the Pampa de Tamarugal east of the coast range.

Iquique—Tarapaca.

Of all these places Iquique, the largest, has the best anchorage, thanks to the shelter afforded by three rocks formerly covered with guano. Nevertheless large vessels are unable to approach the quays, so that all freights have to be landed or shipped by means of barges plying to and fro. In the middle of the century Iquique was a mere group of mud and roofless huts, there being no need of shelter against the rain which so seldom falls on this seaboard. The various structures now introduced from North America and England have all terraced roofs, while the wooden or corrugated-iron walls are so put together as to leave free play to the sea breezes.

Iquique lies, like Arica, in the earthquake zone, and has been frequently destroyed; it is also far removed from any potable water or cultivable land, and had formerly to import all its supplies from Arica. Now it receives sufficient water by an aqueduct running from *Pica* in an upland valley of the Andes. Thanks to a costly system of irrigation, a few Norfolk pines and other trees have also struck root in the public squares and along the promenade skirting the beach southwards in the direction of *Cavancha*.

At Iquique English influence is dominant; here the English own all the workshops, factories, trade, shipping, warehouses and harbour works. They have also constructed the network of railways, some 250 miles long, connecting Iquique with *La Noria* and the surrounding nitrate works. Beyond this point the lines ramify northwards, touching at all the nitrate beds stretching along the eastern slopes of the coast range in the Pampa de Tamarugal, and then returning in sharp curves to the coast at the port of Pisagua.

The mining industry has been completely transformed in this province of *Tarapaca*, which takes its name from an obscure village lying east of the saline Tamarugal plateau, at the issue of a valley in the cordillera. Formerly silver was the chief source of attraction, and the centre of business was the village of *Huantajaya*, about 10 miles east of Iquique, some 3,000 feet above the sea, in the midst of mountains abounding in metalliferous veins. Since the year 1556, when the deposits were discovered, the Huantajaya mines have yielded a quantity of silver estimated at about £70,000,000, or very nearly as much as Cerro de Pasco. At

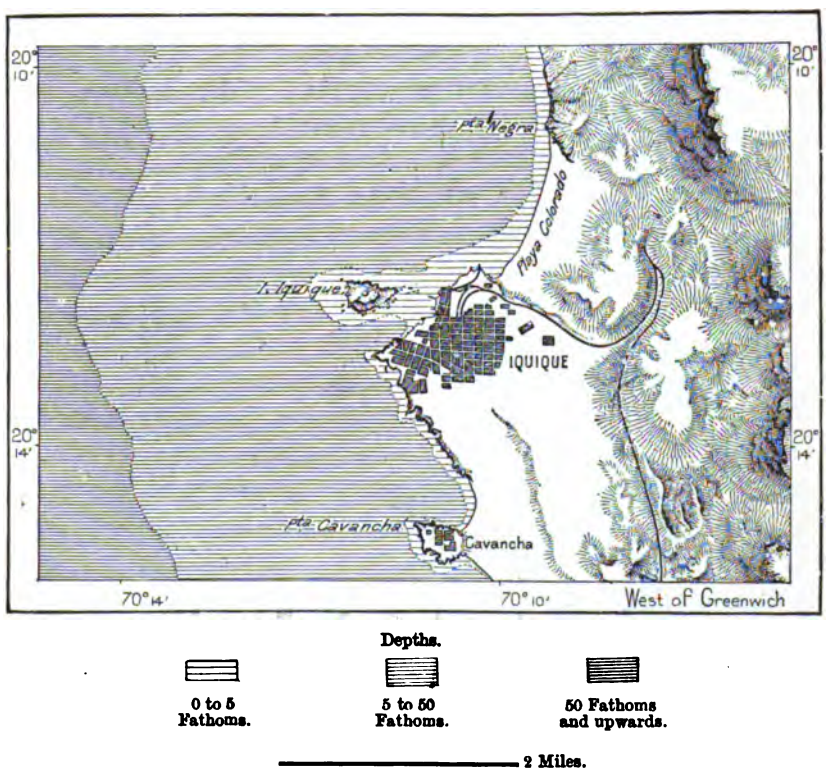
IQUIQUE—VIEW TAKEN FROM THE SEA.

present they are almost abandoned, and Iquique, which owed its existence to these mines, has now turned its attention to the treatment and transport of the chemical substances which, although known to abound in the province, had hitherto been neglected. The guano of the neighbouring islets was first attacked and exhausted by the year 1827. When Frezier visited the place at the beginning of the eighteenth century, the planters of Peru were receiving a yearly supply of from ten to twelve small cargoes.

A chain of workshops supplied with the best modern plant skirts the railway west of the Pampa de Tamarugal, and communicates by branches with the *oficinas*

Fig. 170.—Iquique.

Scale 1 : 96,000.



where the *caliche* is reduced. The operations are carried on without interruption day and night, the electric light alternating with the sun, and the quantity of nitrates extracted from the soil is steadily increasing. In 1889 it had already reached the enormous quantity of 921,400 tons, valued at £6,000,000.

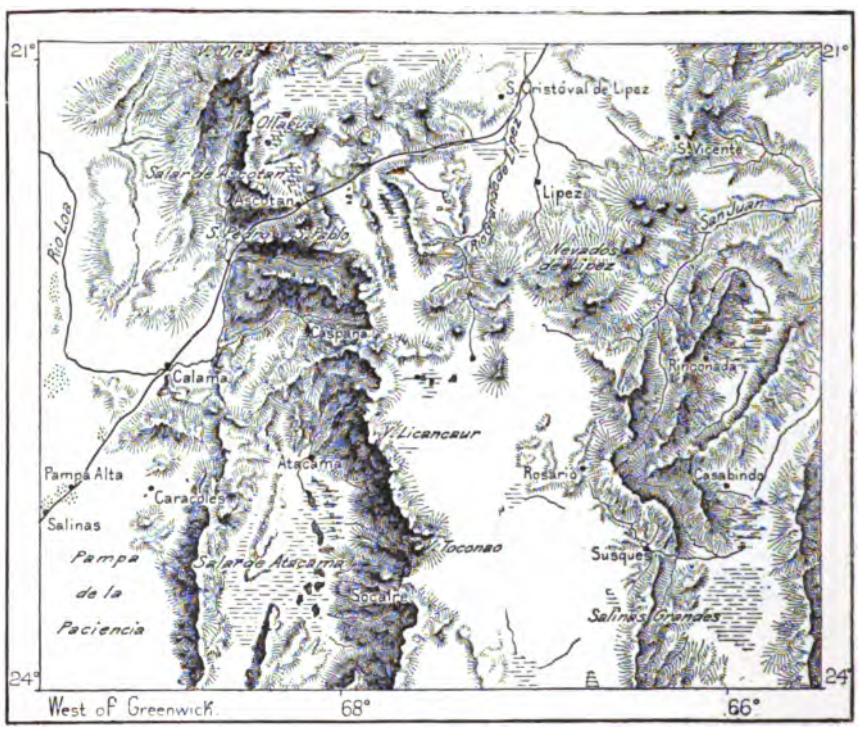
According to the engineers engaged on the works, the still untouched deposits would hold out against this prodigious rate of production for half a century, during which the English capitalists and the Chilian Government would share between them immense profits. But, as in the case of the guano beds, these anticipations may perhaps not be realised, and the deposits may be exhausted sooner than has

been announced by the founders of the industry. Meanwhile, however, these arid regions, which seemed condemned to solitude, have developed a movement of exchanges far more extensive than any other mining or agricultural district in Chili.

Thus is supported a large export trade not only through Iquique and Pisagua, but also through several intermediary ports. *Caleta*, one of these ports, communicates with the works by an automatic railway, on which the trucks move along an inclined plane 2,620 feet high. A labouring population of nearly 30,000,

Fig. 171.—Nitrate and Salt Works of Tarapaca.

Scale 1 : 400,000.



including women and children, has been attracted to this industrial centre. Bolivian traders and carriers come to share in the general movement, while water, vegetables and other provisions are supplied by the village of *Pica*, in an upland Andean valley south of Tarapaca

Patillos—Mejillones—Antofagasta.

Patillos, or the "Ducklings," so named from three islets which seem to float about in the middle of the bay, takes part in the nitrate business, though to a far less extent than Iquique, its railway communications not being yet completed.

TOCOPILLA.

Here also the salines and nitrate deposits of the plateau are very rich, and may take the place of those farther north when exhausted. Formerly the headland of *Pabellon de Pica*, at the north foot of Mount Carrasco, south of Patillos, possessed enormous guano beds, which had been worked even before those of the Chincha Archipelago. But the seaquake of 1877, which overwhelmed Iquique and Arica, nearly made a clean sweep of the village of Pabellon. Of 400 houses only two remained standing, and all the guano was washed away.

Other ports follow southwards, such as *Huanillos*, *Tocopilla* with its copper-foundries, and *Cobija* or *La Mar*, this last well known as having formerly been the only port possessed by Bolivia on the Pacific coast. But the lack of communication with the interior, the complete absence of all harbour works, and the vast distance from the large cities of Bolivia, prevented Cobija from benefiting by the commercial monopoly derived from its political situation.

Tocopilla seems to be still more unfavourably placed. But although presenting nothing but a narrow beach between a stormy sea and frowning cliffs, it has still the advantage of proximity to certain watering places in the interior along the mule tracks leading to the *Caracoles* mines. *Mejillones del Sur*, or simply *Mejillones*, occupies a much more convenient position, like the other Mejillones between Pisagua and Iquique, on the south side of a deep bay amply sheltered by the lofty headland of the Morro Mejillones (2,850 feet), which was formerly covered with guano. But after the discovery of the rich argentiferous lodes at Caracoles, Mejillones was soon eclipsed by Antofagasta on the opposite side of the headland, which, although destitute of a natural harbour, possessed more capital and enterprise. Mejillones was destroyed by the earthquake of 1877, and in 1885 had only 53 inhabitants.

Its rival, *Antofagasta*, another Iquique in its general aspect, history and rapid development, forms a huge aggregate of wooden and galvanised-iron houses, stores, workshops and depots. It is the great centre of the silver industry, though by no means monopolising the export trade in that metal. The railway running from Antofagasta towards the Bolivian plateaux has still the advantage of penetrating into the interior much farther than that of Iquique, and in 1892 had a total length of 560 miles, being at that date the longest of any of the lines on the east slope of the Andes.

The first stage on this railway, which usually makes the ascent in three days, leads to the mines of *Caracoles*, so named from the fossil "shells" deposited in seas of the Jurassic period on their porphyry bed. *La Placilla*, the largest place in this mining district, stands at an altitude of 9,780 feet, in a depression of the Atacama Desert, dominated eastwards by a volcanic range. La Placilla is not connected by a branch with the main line, as the output, which in favourable years amounts to £2,500,000, has greatly fallen off.

Leaving this arid region, where provisions, fuel, water and all other supplies have to be brought from long distances, the miners have penetrated along the line of the new railway into Bolivia, whither they have been attracted by the Huanchaca mines, richer even than those of Caracoles. The railway is carried by

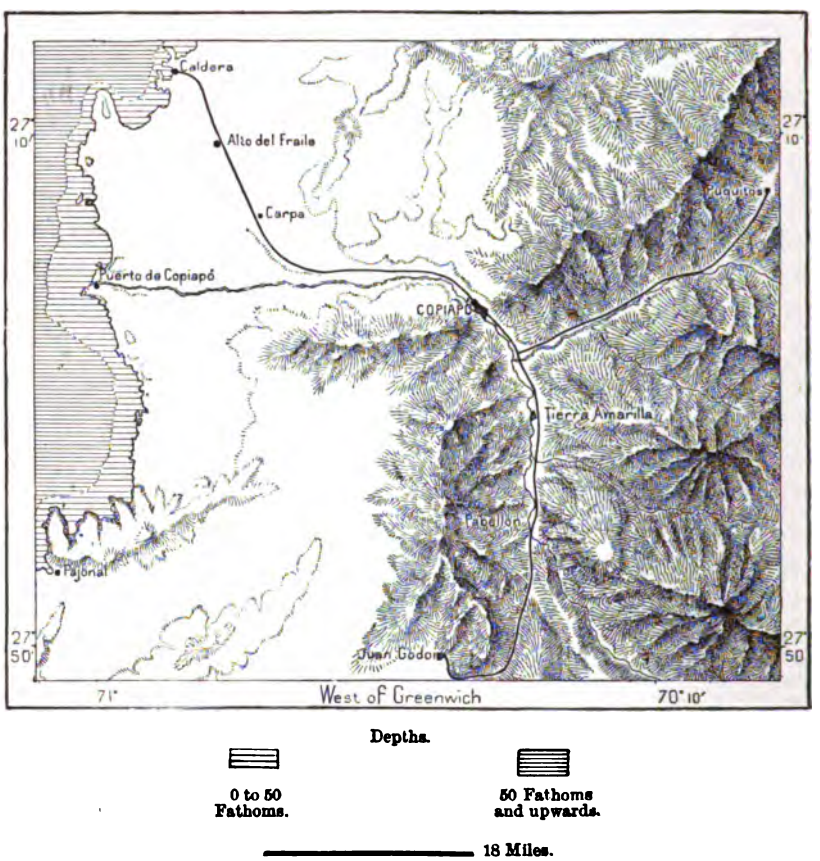
a viaduct, 1,170 feet long and nearly 400 feet high, across the Rio Loa, where are situated the two little stations of *Calama*, "Queen of the Desert," and *Chiuchiu*.

Copiapo—Serena—Coquimbo.

South of Antofagasta follow along the rocky, treeless seaboard a number of little towns and ports, all owing their existence to the mining industries. One of these stations has received the name of *Blanco Encalada*, in memory of one of the

Fig. 172.—Copiapo and its Mineral District.

Scale 1 : 1,100,000.



heroes of the Revolution. *Paposo*, on the old Bolivian frontier, forwards the copper ores of *Rebenton*. *Taltal*, connected by a railway with the nitrate beds of *Cachinal* (7,450 feet), at the foot of the Andes, has become one of the busiest seaports in Chili. *Pan de Azucar*, so named from the "sugar-loaf" peak of a neighbouring islet, exports silver and copper ores as well as borax from *Chañaral Alto* and other places in the Andean valleys and intermediate plains. It is connected by railway with the cupriferous districts of *Carrizalillo* and *Chañaral de las Animas*.

The historical mining city of *Copiapo* stands at an elevation of 1,300 feet on the right bank of a dry watercourse, which formerly ramified in endless branches throughout the upland plains. Here lived the Copayapu Indians, and here the Spanish town was founded during the first years of the Conquest. But its

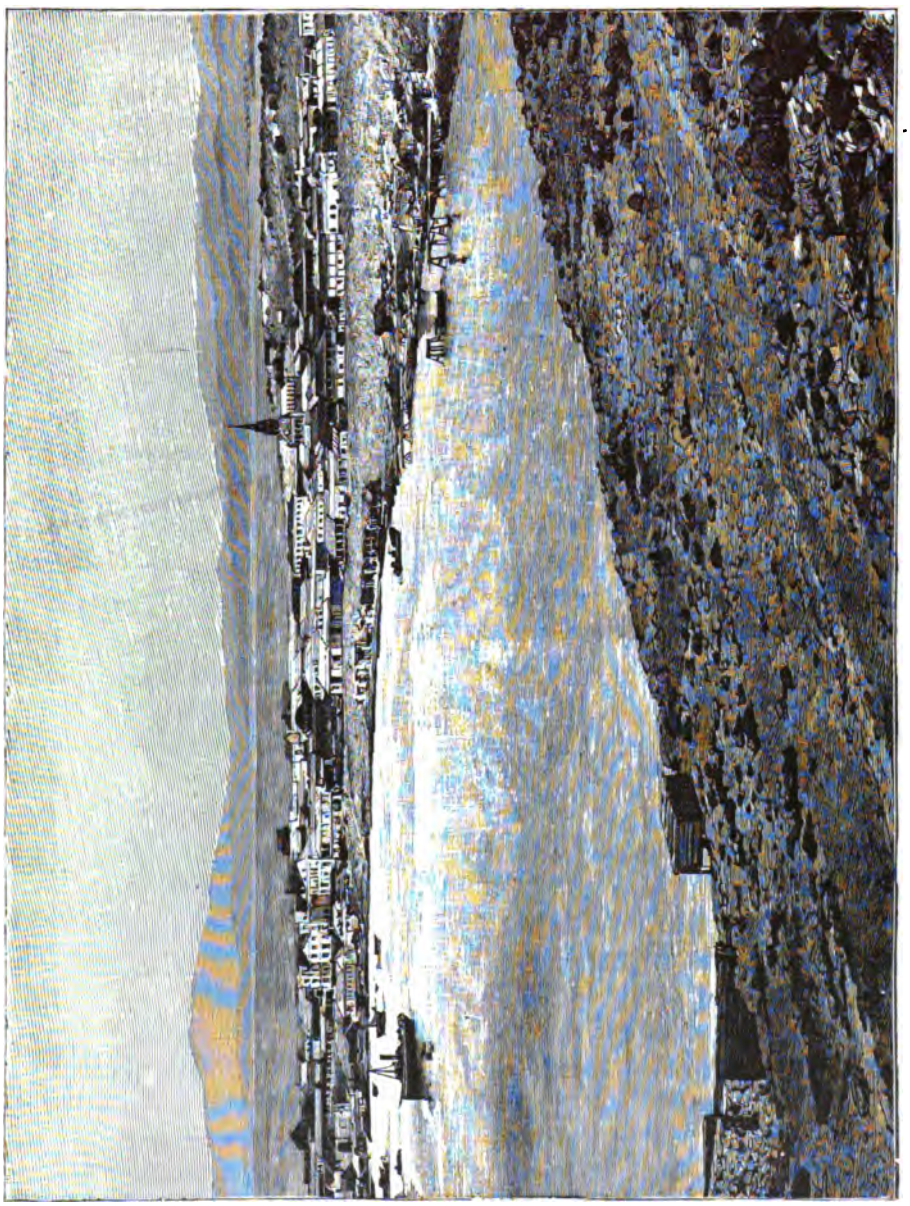


Fig. 173.—General View of Caldera.

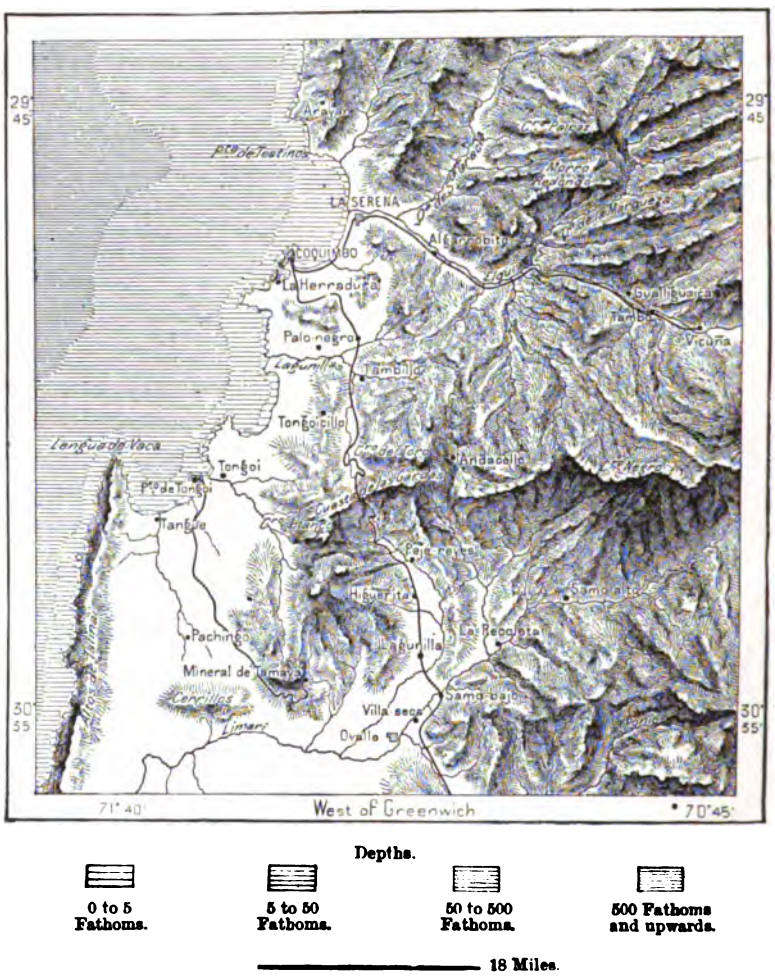
prosperous days date only from 1832, when Juan Godoy discovered the exceedingly productive silver lodes near *Chañarcillo*, 50 miles farther south. Since then the Copiapo district has yielded silver ores to the value of £1,200,000. A statue of the discoverer stands in front of the Mining College at Copiapo, which is

connected by rail with its seaport of *Caldera*, 50 miles to the north-west, and with all the surrounding mineral districts. The Caldera line, the first opened on the Pacific slope of the Andes, dates from the year 1851, and is consequently the oldest in South America, that of Demerara in British Guiana alone excepted.

Copiapo does a flourishing trade with *Famatina*, on the Argentine side of the Andes, which is reached through the Come-Caballos Pass and other difficult

Fig. 174.—La Serena and Coquimbo.

Scale 1 : 1,100,000.



routes, sooner or later to be replaced by a railway over ground already surveyed. Large numbers of meteoric stones have fallen near *Imilac*, on this line.

South of Copiapo the mineral zone still continues to and beyond the mining town of *Yerbabuena* at the foot of Cerro de la Plata ("Silver Mount"). Yerbabuena is connected by rail with the port of *Carrizal Bajo*, which, with its neighbour, *Carrizal Alto*, forms an important centre of the copper-mining industry.

VALPARAISO—VIEW TAKEN FROM THE HARBOUR.

Farther south the Huasco valley begins to assume a different aspect. Here the running waters are copious enough to irrigate the upland valleys, and *Vallenar*, at the confluence of two streams, is an agricultural centre producing excellent wines. The Indian half-breeds of *Freirina*, lower down the Huasco valley, also depend on husbandry, forwarding grapes and other fruits through the port of *Huasco Bajo* at the mouth of the river.

In the Rio Elqui basin, which yields both minerals and agricultural produce, the population becomes more dense; here *Elqui*, or *Vicuña*, the chief place in the valley, is surrounded by rich lands growing vegetables and fruits, especially grapes and figs, which are largely exported. *Serena* (*Serena de Coquimbo*), at the mouth of the river, has acquired considerable importance as a provincial capital. It is the oldest Spanish settlement in the district; but its harbour, if it ever existed, has either silted up or been upheaved, so that the shipping has to stop five miles farther south in the sheltered roadstead of *Coquimbo*. Formerly this place forwarded little except copper ores; but at present it does a general export trade in produce of all kinds, brought by the railways radiating eastwards up the Elqui valley, southwards to *Ovalle*, chief place in the Limari valley, and south-westwards to the ports of *Rivadavia* and *Tongoy*. But the line is still unfinished which is to effect a junction with the Santiago system by the towns of *Combarbala*, *Illapel*, and *Petorca*.

Illapel communicates directly with the sea by the port of *Vilos*, while Petorca forwards its produce through the lower Ligua valley, which is connected by rail with the Rio Aconcagua basin. The Bay of *Quintero*, where Cavendish landed, occupies, north of the Rio Aconcagua, a position analogous to that of *Valparaiso*, south of the same river. Valparaiso, that is, "Paradise Vale," the *Quintil* of the aborigines, was so named by the Conquistador Saavedra, in memory of his native town, the Valparaiso of Old Castile. But the aspect of the Chilian city scarcely justifies such a name. The red or greyish slopes of the hills, with their scanty vegetation of scattered or stunted trees, appear refreshing only in the eyes of travellers coming from the sandy and parched shores of Peru.

Valparaiso.

Valparaiso, which now enjoys such a large share of the trade of the world, long remained an obscure village exposed to the attacks of corsairs. In 1578, when it had a population of only 250 souls, it was pillaged by Drake, and again in 1594 by Richard Hawkins. But its convenient position on the point of the coast nearest to the capital and to the fertile inland plains, enabled it to benefit by the general progress and prosperity of the country. But, despite this geographical advantage, it suffers from the lack of a good harbour, for the bay does not penetrate sufficiently inland to develop a natural haven. The headland projecting seawards is not high enough to shelter the shipping from the south, while the north winds, at times very dangerous, are intercepted by no obstacle.

Efforts, however, are now being made to extend the southern headland by means of dykes and breakwaters.

The form of the city is determined by that of the shore-line. A long quay skirting the curved beach presents a frontage to three parallel thoroughfares, which fill the whole space between the sea and the foot of the hill, and which are intersected at intervals by transverse streets. The two rows of houses lying nearest to the roadstead stand on level ground which has been widened several hundred yards, either by the effects of an earthquake, or by matter washed in with the waves. Continuous lines of suburbs climbing up the slopes are connected with the low-lying quarters by means of lifts.

Being entirely devoted to trade, Valparaiso has scarcely any noteworthy monuments, but it possesses large arsenals, shipyards, workshops and a naval college. In the peaceful year 1890 the shipping exceeded 2,400,000 tons, and even in 1891, a time of sieges, blockades and battles, it fell little short of 1,900,000 tons. The greater part of this trade is carried on with Great Britain, and British influence is everywhere in the ascendant; in some quarters English is spoken as generally as Spanish.

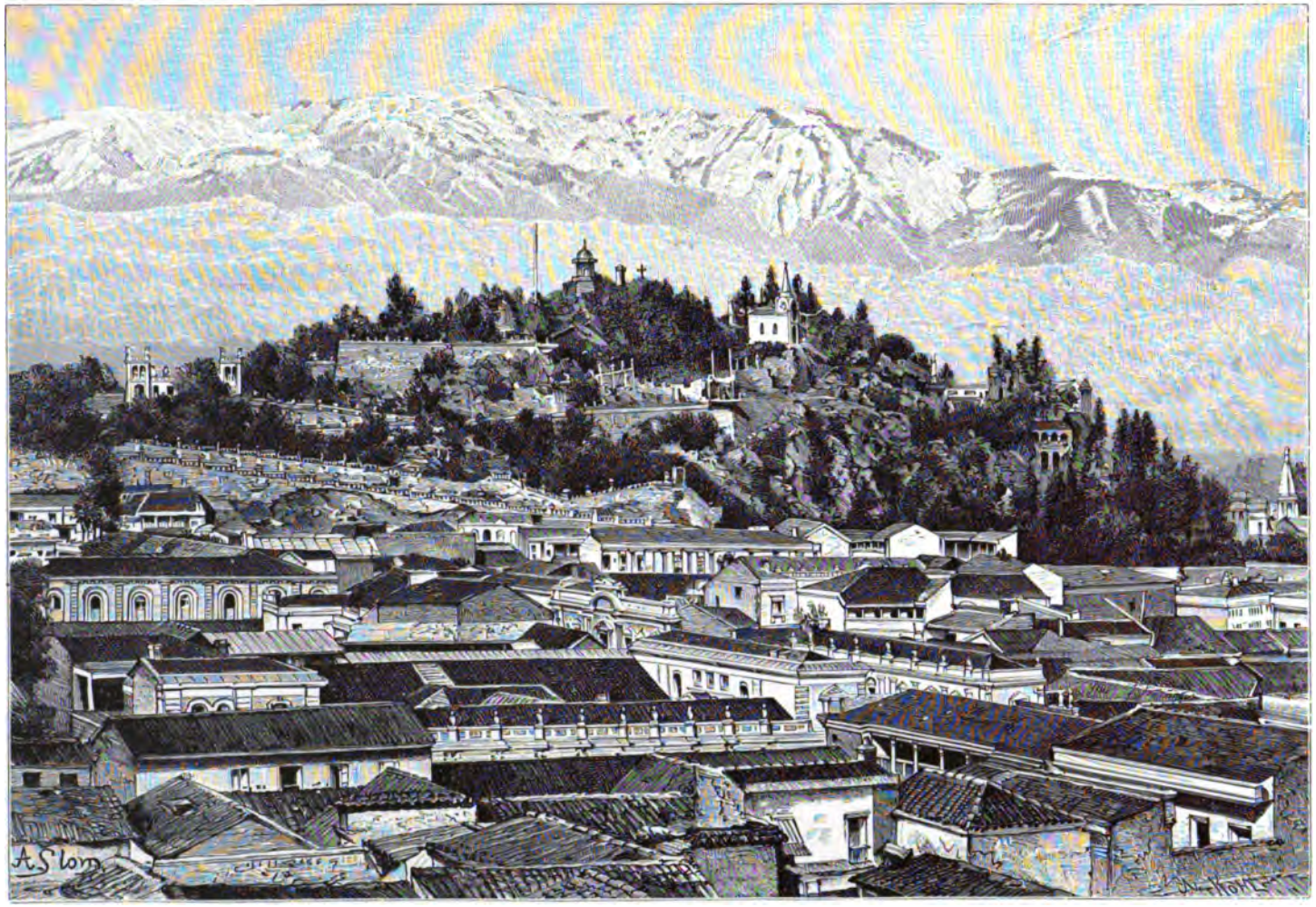
At the narrow depression between the hills and the shore, much additional space was obtained by levelling a western promontory and throwing the debris into the sea. But even this new quarter with the districts ascending the escarpments of the hills, no longer suffices for the growing population. East and north-east, beyond the quays and the railway station, the rows of houses have already reached the foot of the cliffs, here uniting with the fashionable quarter, *Viña de Mar*, where are situated the bathing establishments, hotels and suburban villas.

Santiago.

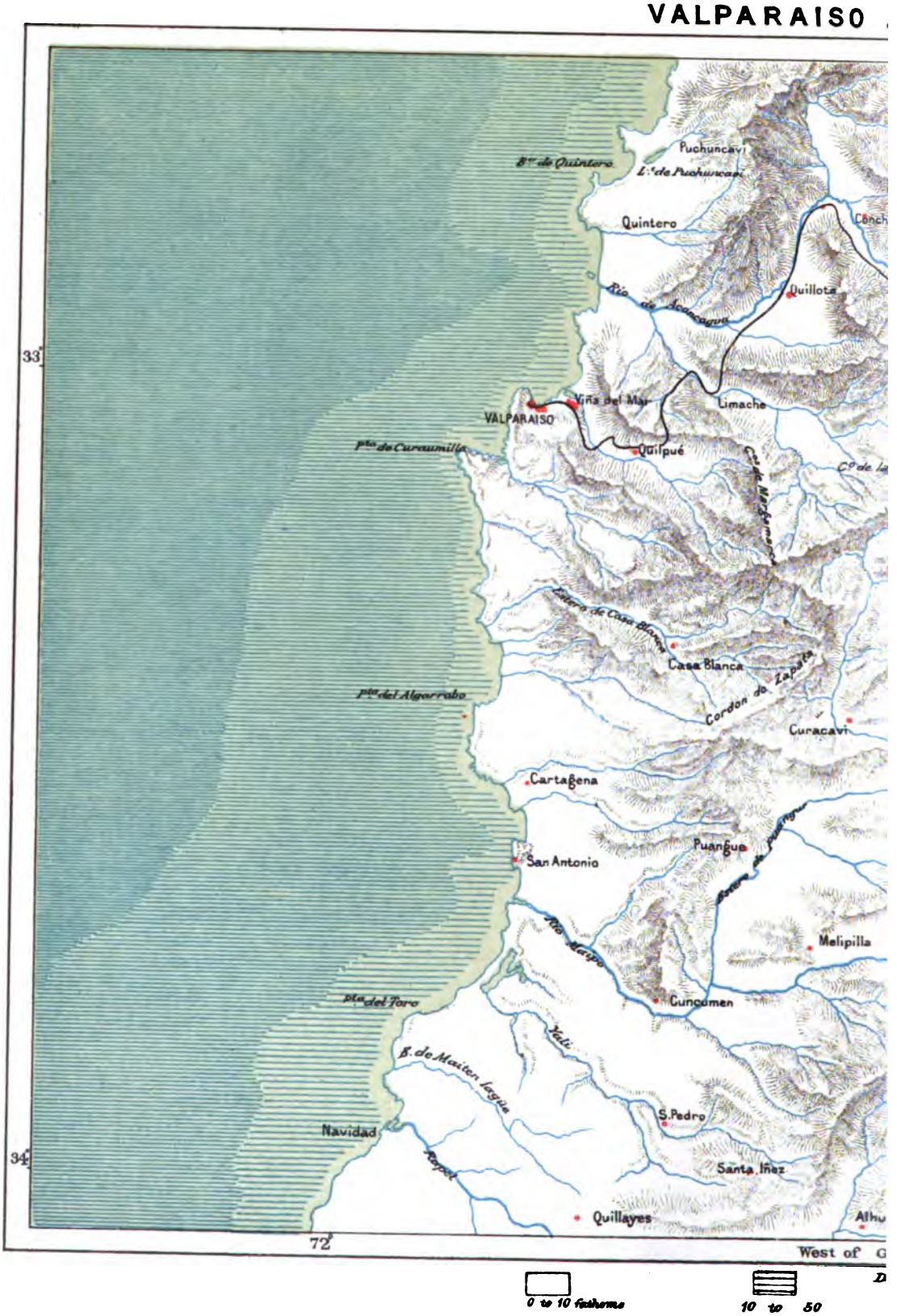
Viña de Mar and *Salto*, another pleasant retreat from the bustle of the trading quarters, are railway stations on the only line (1893) connecting Valparaiso with the capital by *Quillota* and the Aconcagua valley. The much shorter but more difficult route over the mountains runs by *Casa Blanca* ("Whitehouse"), an old wayside inn which has developed into a rural town. A third road, soon to be replaced by a railway, follows the south coast by *San Antonio* and the Rio Maipo valley round to *Santiago*.

This place was founded as capital of the provincial government over 350 years ago. A white marble statue of the Conquistador Pedro de Valdivia, crowning the *Santa Lucia* eminence which dominates the city, bears an inscription to the effect that the "captain," first Governor of Chili, settled his troop of 150 men in this place, where he founded the city of Santiago in the year 1541. Born in Estremadura, he gave the colony the name of his native town, Santiago del Nuevo Extremo, a now forgotten designation replaced by that of Santiago simply, or more specially Santiago of Chili.

On the Pacific seaboard the Chilian capital has no rival in the southern

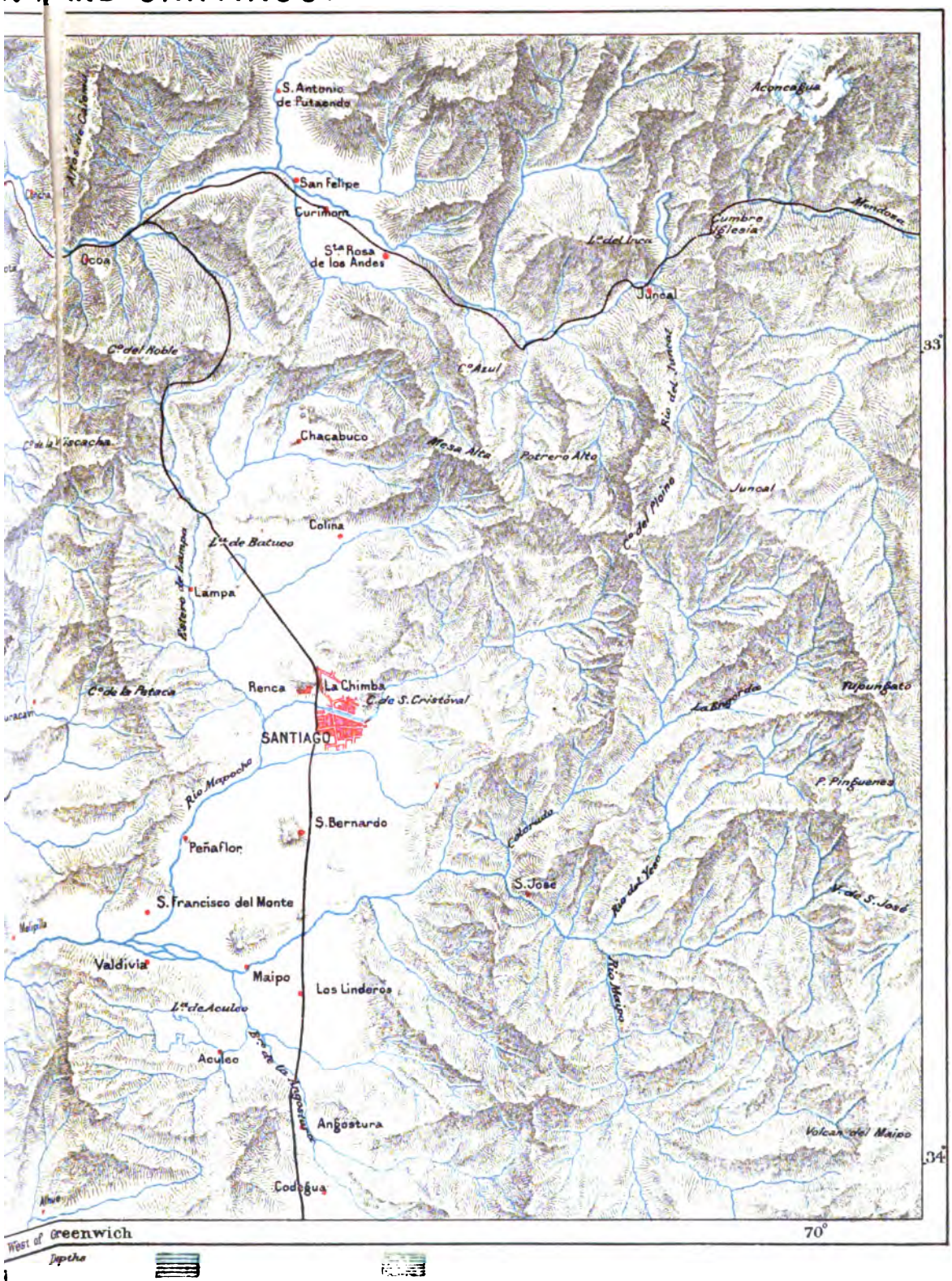


SANTIAGO—VIEW TAKEN OPPOSITE THE CERRO DE SANTA LUCIA.


VALPARAISO
B.ª de Quintero
Puchuncavi
L.ª de Puchuncavi
Quintero
Quillota
Rio de Aconcagua
33°
Viña del Mar
Limache
VALPARAISO
Quilpué
Pta de Curaumilla
Estero de Casa Blanca
Casa Blanca
Pta del Algarrobo
Cordon de Zapata
Curacavi
Cartagena
Puangue
San Antonio
Melipilla
Rio Maipo
Pta del Toro
Cuncumen
Yali
B. de Maiten Isgua
S.Pedro
Navidad
Santa Inez
Quillayes
34°
72°
West of
0 to 10 fathoms
10 to 50

New York, D. A

50 AND SANTIAGO.



Appleton & Co

continent, and in the northern it is outstripped by San Francisco alone. Relatively to its population, scarcely more than 200,000, it covers a vast space, all the houses, as is usual in districts subject to earthquakes, being low even in the business quarters, and generally built round one, two or even three *patios*, that is, courts or inclosures planted with trees. These structures are themselves interrupted by broad thoroughfares, squares and avenues with long strips of verdure, so that, seen from the crests of the encircling hills, Santiago has more the aspect of a vast park than of a great city. The atmosphere is laden with the fragrance of orange-groves, while the former grazing-grounds with their sparse and scrubby vegetation have been transformed to lovely gardens by the fertilising waters of the Maipo canal, the construction of which took over a quarter of a century, 1817 to 1844.

Standing at an altitude of 1,755 feet on the broad level plain between the two cordilleras, Santiago extends some miles along the left bank of the Rio Mapocho, an affluent of the Maipo, whose waters are for most part of the year absorbed by the irrigation canals. On the opposite side of the watercourse stretch the spacious suburbs, connected by bridges with the more central quarters. The main thoroughfare is formed by a splendid boulevard shaded with four rows of poplars, embellished with statues and kiosks, and enlivened with running waters. Every street and avenue terminates in a mountainous prospect, westwards the grey or reddish heights of the coast range, eastwards the spurs of the cordillera with the upper Mapocho valley, a charming glen leading up to the snowy peaks of the Andes.

In the central square are grouped the cathedral, the municipal buildings, the post office and, under the *portales*, or covered ways, the richest and most frequented shops. The volcanic Santa Lucia hill, rising 230 feet above the east side of the city, is beautifully laid out with gardens, exotic plants, marble fountains, kiosks, cafés, theatre and other handsome structures. From its summit is commanded a superb view of the metropolis, the cultivated plains and encircling mountains.

As seat of government and centre of the administration, Santiago possesses some public buildings not destitute of a certain architectural beauty. Here are grouped together nearly all the high schools of the republic, the university with its various faculties, the National Institute, the schools of agriculture, mines, industrial arts, practical engineering, painting, sculpture, music and the military academy. There are also an astronomic observatory, a public library with 70,000 volumes and 40,000 manuscripts, a museum of the fine arts, and a "Salon," where the local artists exhibit their productions, as in the great European capitals. The Natural History Museum comprises a complete collection of the South American fauna, as well as a carefully classed herbarium of several thousand plants. Over 2,400 cultivated species have also been brought together in the Botanic Garden, the Model Farm and the numerous parks in the city and its environs.

South of the capital, *Melipilla*, in the Mapocho valley, exports its ponchos, potteries and agricultural produce through the little port of *San Antonio*, which is connected by a short railway with the mouth of the Rio Maipo. Melipilla was

a familiar name in England and the Colonies during the Tichborne trials, and there can be no doubt that the "Claimant" spent some time in this place.

Farther on, the great highway and railroad traversing the central plain between the Andes and the coast range passes several important places, such as *San Bernardo* at the foot of the twin-peaked mountain of like name; *Rancagua*, near the right bank of the Cachapoal, a main branch of the Rio Rapel, and in the neighbourhood *Cauquenes*, whose thermal waters are the most frequented in Chili.

Curico—Concepcion.

Rengo and *San Fernando*, both in the Rapel basin, are followed by *Curico*, which was founded near the Rio Mataquito in the middle of the eighteenth century, and which, since the opening of the central railway, has become one of the chief trading centres of Chili. Here terminates the Argentine railway ascending to the plateau through the Rio Planchon pass. Curico is now endeavouring to establish direct communication with some port on the Pacific by a line crossing the coast range down to the Rio Llico valley. In this valley lies the navigable Lake Vichuquen, 115 feet deep and 3,750 acres in extent, consequently spacious enough to accommodate large fleets. But a canal about two miles long would have to be constructed between this basin and the roadstead of *Llico*, which would itself have to be sheltered by piers and breakwaters.

Curico is outstripped in trade and population by *Talca*, which occupies a favourable position in the fertile valley of the Rio Maule. Talca enjoys direct communication with the port of *Constitucion*, formerly *Nuevo Bilbao*, on the left (south) side of the Maule estuary, which, despite the bad approaches, has developed a considerable foreign trade. It has been proposed to construct an artificial harbour in the so-called Caleta creek south of the Maule, which a moderate outlay might make one of the best havens in Chili. Farther south the little port of *Curanipe* serves as the outlet for another *Cauquenes*, capital of a department.

Along the central railway follow the busy towns of *Linares*, *Parral*, *San Carlos* and *Chillan*, this last a great agricultural centre and a much-frequented cattle market. It communicates through the neighbouring station of *Bulnes* with the port of *Tomé* on Talcahuano Bay.

The historical city of *Concepcion* dates from the year 1541, when Valdivia, immediately after the foundation of Santiago, established a military station on the right bank of the Biobio near the spot where now stands the capital of South Chili. But Valdivia, unable to hold his ground against the Indians, was captured after a sanguinary battle and tortured to death. The few settlers had to take refuge in Santiago, and although the town was rebuilt some years afterwards under the shelter of a fort, it continued to suffer much from the attacks of the Araucanians. Its development was also retarded by earthquakes, irruptions of the sea and fluvial inundations, so that it had to be removed in 1752 to its present site seven miles from the mouth of the river. But it is still destitute of a maritime harbour, and large vessels have to ride at anchor outside the bar.

The railway bridge spanning the Biobio at Concepcion is one of the triumphs of modern industry, consisting of 62 massive piers with a total length of 2,000 yards, or 440 more than the viaduct crossing the Volga at Sizran, the longest on the European mainland. The suburb of *San Pedro* stands at the southern extremity of the bridge, beyond which the railway continues to skirt the coast as far as the southern coalfields.

A line seven miles long runs from Concepcion north to *Talcahuano* (*Talcaguano*)

Fig. 175.—Concepcion, the Biobio and Neighbouring Inlets.

Scale 11: 1,000,000.

Bay, which is completely sheltered on the west by the Tumbel peninsula, and on the north by Quiriquina Island and a headland projecting from the coast. Thus is formed a magnificent closed basin protected from all winds, and especially from those of the south-west, the most dangerous on this seaboard. The Government has taken possession of the south side of the bay, where it has established the arsenal and the chief strategical base of operations along the south coast of the continent. An artificial harbour has been enclosed in front of Talcahuano by piers carried out to a depth of 26 feet at low water. Thus are combined all

possible advantages—good anchorage in deep sheltered waters, facilities of defence, proximity to a large city, a copious river, rich coalfields and metallurgic works.

But Government regulations have driven much of the local trade to other ports in the bay, such as *Penco* on the east side, where Concepcion had been originally founded, and *Tomé*, close to the entrance on the same side and at the terminus of the line from Chillan. Including all these ports the total annual shipping of the Talcahuano basin falls little short of 3,000,000 tons.

Arauco—Valdivia—Maullin—Chacao.

Arauco Bay, south of Concepcion, is a repetition of the Talcahuano inlet, but on a larger scale, and with a much wider entrance. The town of *Arauco*, which gives its name to the district and province, and which is itself derived from the Araucan Indians, from whom it was wrested, is a quiet little trading station, whereas *Coronel* and *Lota*, on the east side of the bay, are active industrial centres. Here the carboniferous beds of the tertiary epoch have been surveyed for a space of nearly 100 miles along the coast south of Tomé. They are easily worked, and the coal, although inferior to the English fuel, is far superior to that of most other regions. Since its introduction to the market in 1855, its use has become general, not only in Chili, but along the whole of the Pacific seaboard. The yearly output of the Arauco district already exceeds 400,000 tons, and here the deepest shaft traverses three successive beds down to a depth of 920 feet. Most of the coal is used up on the spot in the glass-works, brickfields and copper-foundries of Lota and Coronel, the most active manufacturing centres in Chili. *Lebu*, at the mouth of a rivulet outside the bay, does a considerable export trade in coal, but the copper-mines of the neighbouring Sierra have hitherto been neglected.

Nacimiento and *Angol*, in the Biobio basin south-east of Concepcion, as well as *Los Angeles*, *Mulchen*, *Collipulli*, *Traiguen*, all lie in territory which the Araucanians had recovered from the Spaniards, and which the Chilians are now gradually re-occupying by the insidious processes of colonisation and the sale of strong drinks to the natives.

East of Traiguen, the most advanced station in this direction, the railway is carried over the Rio Malleco by a fine viaduct 1,400 feet long and 310 feet above the stream. Farther south, the Chilian settlers in the Rio Cauten valley have assumed a very aggressive attitude towards the Indians. After occupying *Nueva Imperial* they have pushed forward as far as *Temuco*, half-way to the Andes, and the whole country must soon be annexed, for it is one of the healthiest agricultural regions in the whole of Chili.

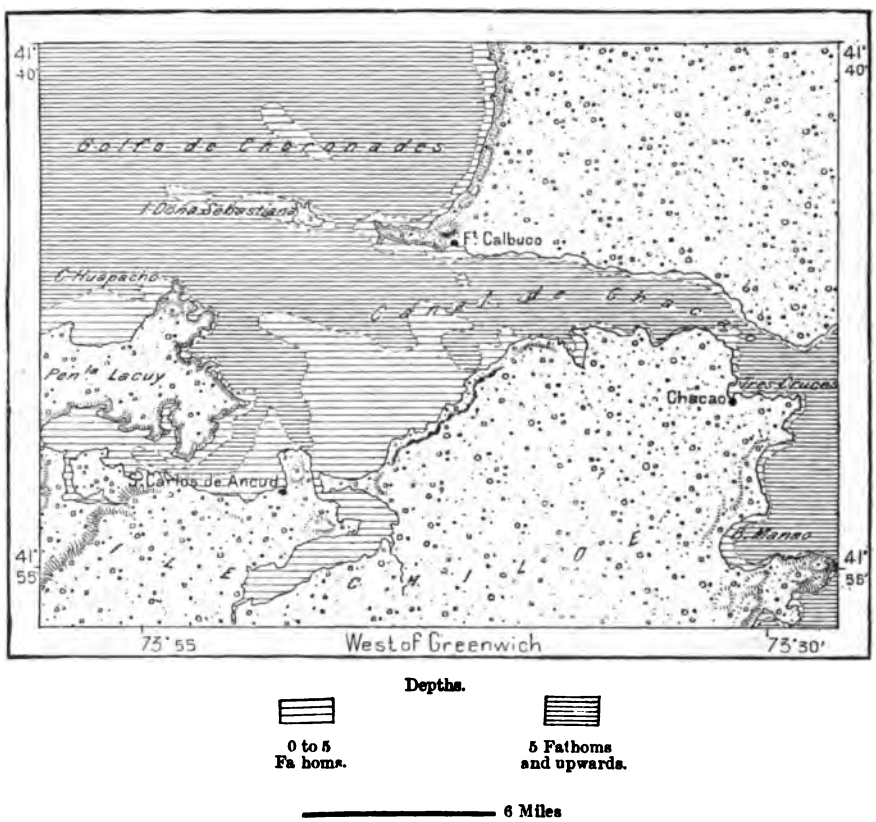
Valdivia, a name recalling the first years of the Conquest, occupies a position somewhat analogous to that of Concepcion, lying on the banks of a considerable stream at some distance from the coast, where it possesses the port of *El Corral*, sheltered by a rocky headland from the west winds. At present the chief exports are hides, lumber, cattle and "lager beer," for Valdivia is half German.

Puerto Philippi and *Puerto Domeyko*, at the extremity of the Chilian mainland,

perpetuate the memory of the two chief explorers of this region. But here the most promising settlement is *Maullin*, at the mouth of the Maullin River, which has the advantage of standing on a navigable estuary near the Chacao Channel flowing between the continent and the island of Chiloe. The eastern entrance of this passage is commanded by *Fort Calbuco*, and *Puerto Montt* occupies an admirable position near the extremity of the lacustrine fiord formed by Reloncavi Bay and at the southern termination of the great central plain of Chili. Although the

Fig. 176.—Chacao Channel.

Scale 1 : 400,000.



Chilian and German settlers are still far from numerous, Puerto Montt, formerly *Melipulli*, has made steady progress since its foundation in 1853.

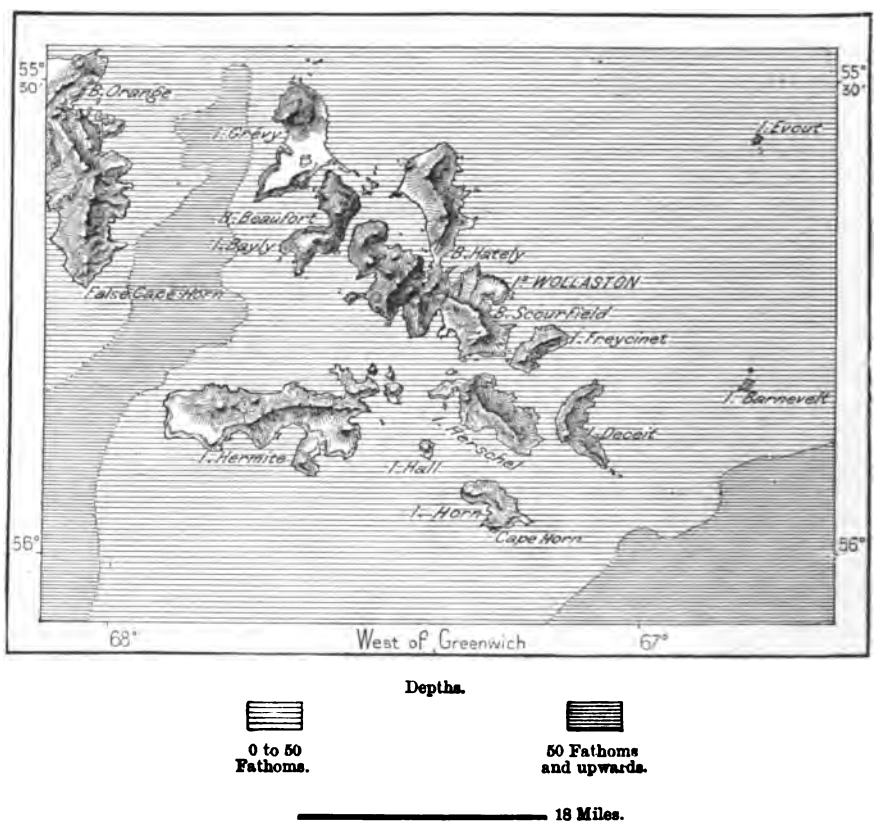
Chiloe Island may be regarded as an integral part of South Chili so far as regards its climate, soil, products and inhabitants. The towns also present the same general aspect. *Castro*, founded in 1566 on a strip of land on the east side, has remained an obscure village, its dangerous island- and reef-studded waters being avoided by shipping.

Chacao, on the channel of like name over against the mainland, is also of difficult access, so that most of the traffic has been deflected farther west to the

port of *Ancud*, the *San Carlos* of the first Spanish settlers. Ancud stands near the western entrance of the Chacao passage, and although large vessels cannot approach the shore, they find good anchorage in a broad, well-sheltered bay, formerly much frequented by whalers. Since these have become rare, Ancud exports little except timber and agricultural produce. About 2,000 of the native Chilotes depart every year for the southern archipelagoes, where they collect lumber and engage in seal fishing. Few of these remain in the islands, and the

Fig. 177.—Cape Horn Archipelago.

Scale 1 : 900,000.



permanent emigration of the surplus population of Chiloe is directed towards the cities of the mainland.

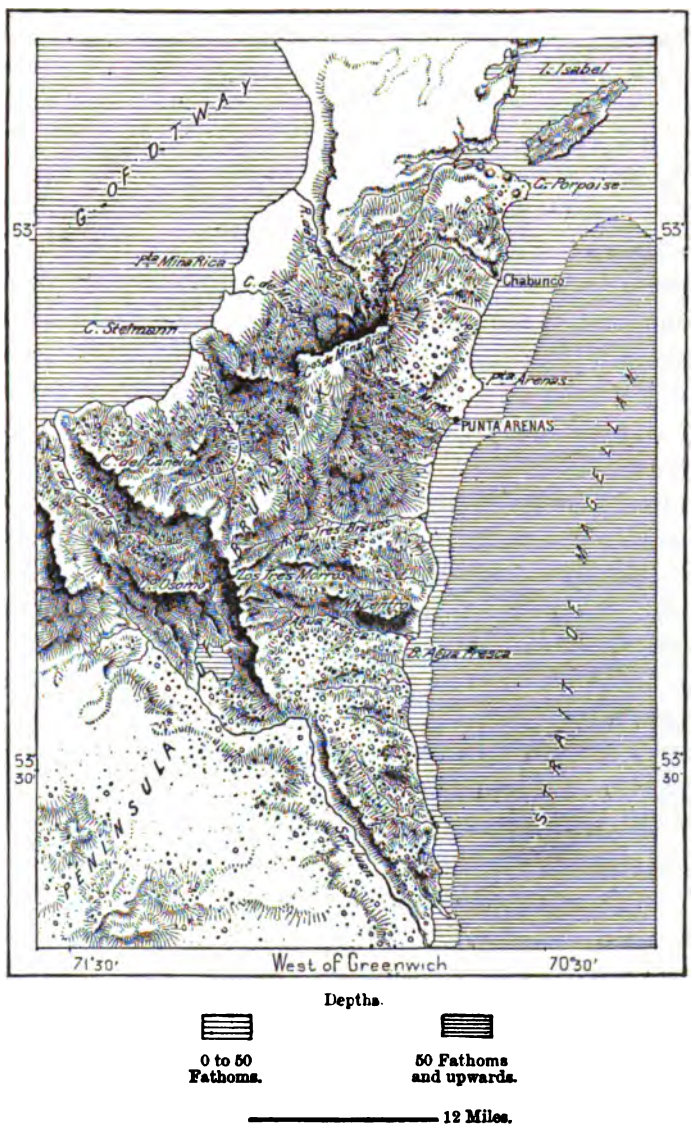
The labyrinth of Magellanic islands has hitherto attracted but few settlers. They are naturally repelled from this region of rains, snows and high gales. Nevertheless the ocean steamers have already established a few stations, which may be regarded as so many starting points of future settlements. A stock-breeding farm has been founded on the banks of the Pulena, at one of the most convenient entrances to the Southern Andes. Here an estate of nearly 500,000 acres of arable land is owned by a single proprietor.

Melinca—Punta Arenas—Mas a Tierra.

A German has founded the station of *Melinca* on one of the islands of the Guaitecas group. Some Frenchmen have settled on a member of the Chonos Archi-

Fig. 178.—Punta Arenas (Sandy Point).

Scale 1 : 800,000.



pelago, where they engaged in the tinned mussel business. The well-sheltered ports of *Otway* and *Conway* in the south of the Chonos and Wellington Islands serve as convenient harbours of refuge for vessels in distress navigating those stormy seas. Navigators also find good shelter, abundance of fuel, pasturage and

pure drinkable water in *Port Eden* south of the English Narrows, in *Puerto Bueno* at the northern entrance of Smyth Strait, and at *Muñoz Gomero* at the southern entrance of the same channel in King William's Land.

Till recently the shores of Magellan Strait and of Tierra del Fuego were regarded as condemned to perpetual solitude and death. The frequent shipwrecks that have taken place about the headlands and fringing reefs of the insular groups, the reports of mariners regarding the storm-tossed waters, the torrential rains and intense cold of the Cape Horn archipelago—lastly, the vast deserts of the interior, the snows and glaciers of the surrounding mountains, had earned for these terminal lands of the South American continent a terrible reputation, as attested by such local names as *Port Famine* in Magellan Strait, *N'Entre Pas* ("Enter Not") in Dawson Island and *Anxious Point* in Tierra del Fuego.

Nevertheless such a passage as Magellan Strait, 340 miles long, much frequented by sailing-vessels and offering special advantages to steamers, could not permanently remain without some maritime station. So early as the close of the eighteenth century the illustrious Galician pilot Sarmiento had attempted to found a colony on the shores of the strait, and but for a series of untoward incidents which the daring and persevering pioneer was unable to overcome, the "City of San Felipe," well situated on the strait, had every prospect of maintaining itself. But the failure of supplies to arrive in time transformed it to the "Port Famine" of sad memories.

Before the establishment of permanent stations a signal, placed at the extremity of Cape Froward, indicated the spot where an ocean letter-box would be found, entrusted to the care of seafarers of all nations.

In 1843, when the Chilian Government revived the project of Sarmiento, it established a convict station at *Puerto Hambre* (Port Famine), which was afterwards removed to a position a little farther north, but on the same side of the strait in the Brunswick peninsula. Here was founded in 1852 the town of *Punta Arenas* ("Sandy Point"), a penal settlement which at first made but slow progress. But as soon as it became a centre of free industry it developed rapidly.

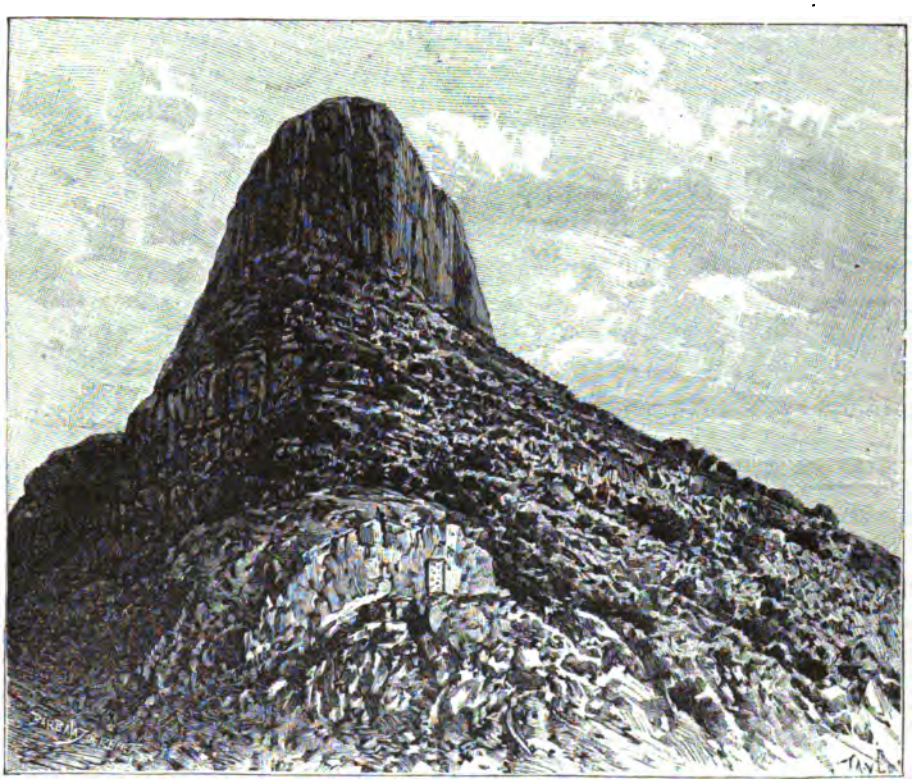
Situated, as indicated by its name, on a sandy beach, Punta Arenas presents no very inviting prospect, but possesses immense resources as a victualling station. Since 1868 the neighbouring auriferous deposits have been worked. A still more useful discovery was that of carboniferous beds, also in the vicinity, from which passing steamers can replenish their bunkers. Another flourishing industry is stock-breeding, which is now carried on not only on the mainland, but also in Tierra del Fuego, and especially along the shores of Gente Grande Bay. Ranchos are springing up in every direction, and from these sources Punta Arenas draws the supplies required for its victualling stores, and even for an increasing export trade. In 1882 the German scientific expedition despatched to observe the transit of Venus had its headquarters in this terminal town on the American mainland.

The oceanic islands which belong politically to Chili have but a scant population, and some are even quite uninhabited. Such are *San Felix* and *San Ambrosio*, where nothing is found except a few shrubs and some guano beds deposited by the

seals. Even *Mas a Tierra* and *Mas a Fuera* were at first inhabited only by the goats left loose by Juan Fernandez, and by wild cats descended from those which had escaped from passing vessels. But towards the end of the seventeenth century these islands became the resort of buccaneers, who here obtained supplies of fresh meat and water, and from that time they frequently received temporary visitors.

Nevertheless Mas a Tierra, which had been most visited, was found to be unoccupied in 1704, when an English skipper here abandoned Alexander Selkirk, one of his crew, whose history, combined with that of another castaway on Tobago Island, supplied Defoe with the materials for his immortal romance of *Robinson*

Fig. 179.—Mount Selkirk, Juan Fernandez Island.



Crusoe. Near the most frequented anchorage is shown a cave on the north side where dwelt the unfortunate derelict. Here the officers of an English frigate have placed a marble tablet with an inscription recording the adventures of Selkirk. Later Mas a Tierra was utilised by Spain, and afterwards by Chili, as a place of detention for criminals. Now both islands have been granted to a rich stock-breeder, and in 1878 Mas a Tierra had a small permanent population of 54 persons.

Easter Island, which the Chilian Government has made a penal settlement, is also engaged chiefly in stock-breeding, and carries on a little trade with Tahiti. In 1874, when it was occupied by Chili, the Frenchman who had installed himself in the island was governing it through a "queen." This

potentate held a council of women every evening, and on their advice issued her edicts regulating the conduct of the men, their husbands. The "high priest" acquired his right to direct the public worship by winning a swimming match between the large island and the neighbouring *Sala-y-Gomez*, a mere basalt rock without any resources.

VIII.

Material Condition of Chili.

Since the close of the colonial period the population of Chili has increased more rapidly than that of any other Andean region. If the early estimates and present returns can be trusted, the relative rate of progress has even been much greater than that of Colombia, having advanced from 700,000 to 3,500,000, or nearly fivefold, since 1810. But statisticians depend more on conjecture than on precise figures. As the starting point of their calculation they take the census of 1885 and infer the annual increase by adding to the total some 50,000 independent Indians, and allowing a deduction of 15 per cent. on the official estimates.

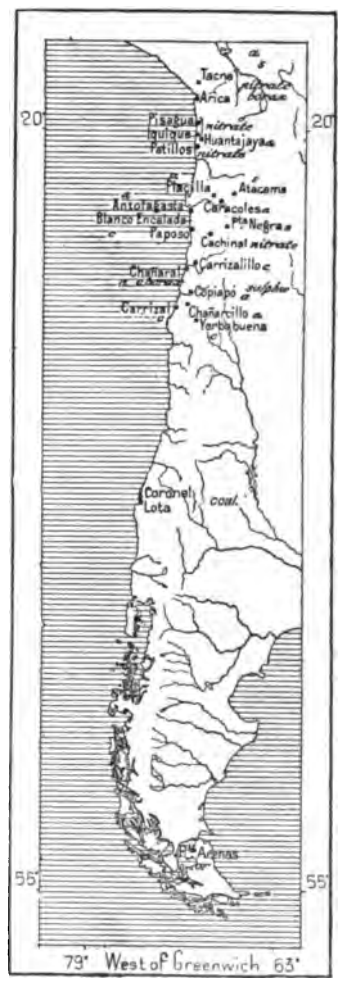
But even so, the density of the Chilian population can be compared to that of Europe only in the central provinces, where are situated the two chief cities, Valparaiso and Santiago. North and south of this zone the provinces are very thinly peopled. As in all other countries receiving a considerable stream of immigrants, the urban is relatively larger than the rural population, though it has not yet acquired the absolute preponderance. According to the returns for 1885 the respective figures were 1,062,544 townsfolk and 1,464,776 countryfolk. The equilibrium of the sexes seems to be perfectly established, the same census showing 1,263,640 males and 1,263,680 females in a total of 2,527,320.

Agriculture.

Although Chili still possesses vast stretches of land awaiting cultivation, hundreds of thousands own no freehold, and many of these seek their fortunes either in the *Cuyo*, that is, the conterminous Argentine province, or in Peru and Bolivia, or even in California. On the other hand, the tide of immigration has been continuous, except during the recent civil strife, settlers being attracted to the mining industries in the northern districts and in the province of Concepcion, or to Santiago and to the other large industrial and trading places, especially along the seaboard. Some farmers, also, nearly all German and Swiss, have settled in the southern provinces, where the Government allots them the lands appropriated from the Araucanian aborigines. Thus the foreign element increases from census to census more rapidly than the native, numbering at present nearly 100,000 if Peruvians and Bolivians be included.

Amongst European colonists the Germans, mostly farmers, brewers, surveyors and petty dealers, are the most numerous. Next in importance are the English, mainly merchants and miners, the Italians and the French in the order named. But if the present exodus from Italy continues, the Italians will soon outstrip all others in point of numbers. Since 1875 the Chinese have also taken part in the movement. But the general increase is mainly due to the natural excess of births over the mortality, although, owing to the defective registration, the official returns would seem to show the reverse.

Fig. 180.—Mines of Chili.
Scale 1 : 37,000,000.



a Silver. c Copper. s Salt.

620 Miles.

The agricultural zone, which properly begins with the province of Coquimbo, comprises all the mainland thence southwards, with the rich and well-watered island of Chiloe. This industry already yields sufficient breadstuffs for a mean annual export trade of about 5,500,000 bushels, chiefly to Peru, Bolivia and Ecuador, where the Chilian cereals have already driven those of North America from the market. They even compete with those of California along the central American seaboard. As in France, the chief crop is wheat, estimated at 28,000,000 bushels in normal years, all other cereals yielding about 8,000,000 bushels.

Viniculture, introduced at an early date, has also acquired some development since the middle of the present century in the region between the Huasco valley and Valdivia. Here about 250,000 acres are under vineyards; but the grape, chiefly of French stock, appears to have a tendency to approach the Spanish and Portuguese (sherry and port) in flavour. About 110,000 gallons of wine were exported in 1888, when imports were made almost impossible by a prohibitive duty of £4 per hogshead. A kind of coarse cider (*chicha*) is fabricated from the apples of European stock which are yielded in enormous quantities by the orchards of the southern provinces, where the plant now runs wild. Seri-culture has also acquired some development in Chili, the only South American country where attention has been paid to this industry. In 1890 the crop of cocoons was estimated at over 11,000 pounds weight.

Chili is too mountainous to find room for extensive cattle-runs, and has consequently to import much stock from the Argentine plains. Formerly the Pampas Indians made frequent incursions into Argentine territory, the Chilian cattle-

dealers being their confederates in these plundering expeditions. The animals were thus procured at a low price, and generally sold at a large profit at the famous horse and cattle fairs of Chillan.

Tierra del Fuego is best suited for this industry, and here numerous cattle-farms have already been established along the shores of Magellan Straits and the lateral inlets. But in Fuegia scarcely any agricultural produce can be raised except some vegetables, especially potatoes, and a few fruits such as strawberries. All attempts to acclimatise cereals have failed, owing to the fierce south-western gales and the morning frosts, which are felt even in January, which is the mid-summer of these austral lands.

But while agriculture makes rapid progress, the condition of the peasant classes has perhaps deteriorated. Owning no land, they are obliged to seek employment under the great territorial proprietors, who possess vast domains of from 100,000 to 500,000 acres. With low wages, wretched dwellings, insufficient and often unwholesome food, the rate of mortality is naturally excessive amongst the *peones* or *huasos* ("Hodges" or "farm labourers"). Amongst them the *inquilinos* ("tenants") constitute a sort of aristocracy, because, although receiving less pay, they are provided with cabins and a plot of land, always located on the boundaries, in order to defend the estate from marauders.

This system of large domains, combined with the extremely low rate of wages, bars all competition on the part of German, Swiss, Italian or other foreign peasantry, who must have at least a "living wage." The European squatters have to live apart on small holdings assigned to them by the Government in the still thinly-peopled southern provinces. But most of the recent arrivals have a hard battle to fight before they can acquire even a moderate degree of comfort. Despised or hated as *gringos* by the native populations, often ill-treated by the Government underlings, cheated by the dealers and middlemen, they often run great risk of falling into the helpless condition of the peones. Their plight is at times even worse, for they lack the power of endurance which can be acquired only by long suffering.

The public domain is disposed of at an average rate of about 125,000 acres a year, yielding a revenue of from £240,000 to £320,000. In the Magellanic regions, however, the lands are not sold, but leased in very large lots for a period of twenty years.

Mineral Resources—The Nitrates.

The mineral resources of Chili surpass even those of the neighbouring Peruvian and Bolivian States, famous as they are for their mineral treasures. It should, however, be noticed that a large part of the Chilian mines lies in territory but recently wrested from these two central Andean republics. The annexed provinces may be regarded as one vast deposit of silver, nitrates, copper, borax and salt.

Although one of the least widely diffused metals in Chili, gold has yielded

CHILLAN—MARKET-PLACE.

altogether a sum little short of £40,000,000 between the middle of the sixteenth century and the year 1888. Towards 1880 the production had dwindled down to a trifling amount, when the industry was again revived by fresh discoveries.

Silver, which occurs in far greater abundance, especially in the former Bolivian district of Caracoles, north-west of Antofagasta, yields a yearly sum of about £1,200,000, and this might be easily increased but for the present depreciation of the metal.

As a copper-producing region Chili held till lately the first place, yielding in 1879 as much as 50,000 tons, or one-third of the total output of the world. But since then she has been surpassed both by the United States and by Spain. Including iron and all other minerals, the yearly production of the mines properly so called is estimated at over £4,000,000.

The nitrates extracted from the soil and treated in the rainless northern zone return a much larger revenue to the capitalists than the metals. Under the direction of foreign engineers, nearly all English, about 30,000 Chilians, Bolivians, and Peruvians are engaged digging and delving on the elevated saline pampas, from which they extract the caliche in prodigious quantities. This raw material is treated on the spot in a chain of oficinas stretching along the cordillera, where it is reduced by various processes to the condition of saleable nitrates destined for the manufacture of gunpowder or for the much more important preparation of artificial manures.

The nitrate industry, which has covered apparently uninhabitable regions with numerous villages, has been rapidly developed, and at present supplies the largest item in the Chilian revenue. Thanks to this wealth of chemical substances, with which must be included salt and borax, thanks also to the coalfields such as those in the neighbourhood of Concepcion, the capitalists have found it profitable to establish workshops on the spot, instead of forwarding the raw materials to Great Britain, where they had hitherto been reduced and distributed in various forms over the whole world.

Manufactures—Trade—Shipping.

Chili has thus already become a manufacturing country in virtue of her copper-foundries, silver-refineries, chemical, smelting and other works, with their tall furnaces like those of the Old World, on which they have been modelled. There is scarcely a branch of human industry that is not represented by factories furnished with modern plant, and employing numerous hands. The wheat of the southern provinces supplies grist to several large flour-mills; Viña del Mar near Valparaiso, Penco and Tomé near Talcahuano, have sugar-refineries; textiles are woven at Santiago; the potter's wheel is kept going at Penco and Lota; paper-mills are at work in Llai-Llai; and at Chillan have been set up the first nail-works in South America. In these industrial centres the peasantry are already being transformed to a proletariat class.

Commerce, fed by the output of the mines and, to some extent, by the agri-

cultural produce, and even in a slight degree by manufactured wares, enables Chili to take a relatively high place amongst the trading nations of the world. Even in 1890, a year of political strife, the exchanges amounted to nearly £40,000,000. By far the largest share in this trade is taken by Great Britain, which in the year 1880 took nearly 45 per cent. of the whole of the imports, Germany and France being respectively represented by 23 and 12 per cent. In the export trade the three countries follow in the same order, except that the share of England is even still larger, no less than 68 per cent. in the same year 1880.

Fig. 181.—Communications of Chili.

Scale 1 : 37,500,000.

Railways.

Railways in progress.

Regular marine service.

500 Miles.

The exports are mainly mining and agricultural produce, the former representing in 1888 as much as six-sevenths of the total, and the nitrates more than half of the mining products. In the import trade the chief items are such manufactured wares as textiles, machinery, implements and utensils of all kinds, jewellery and arms, and provisions, such as wines, spirits and tobacco.

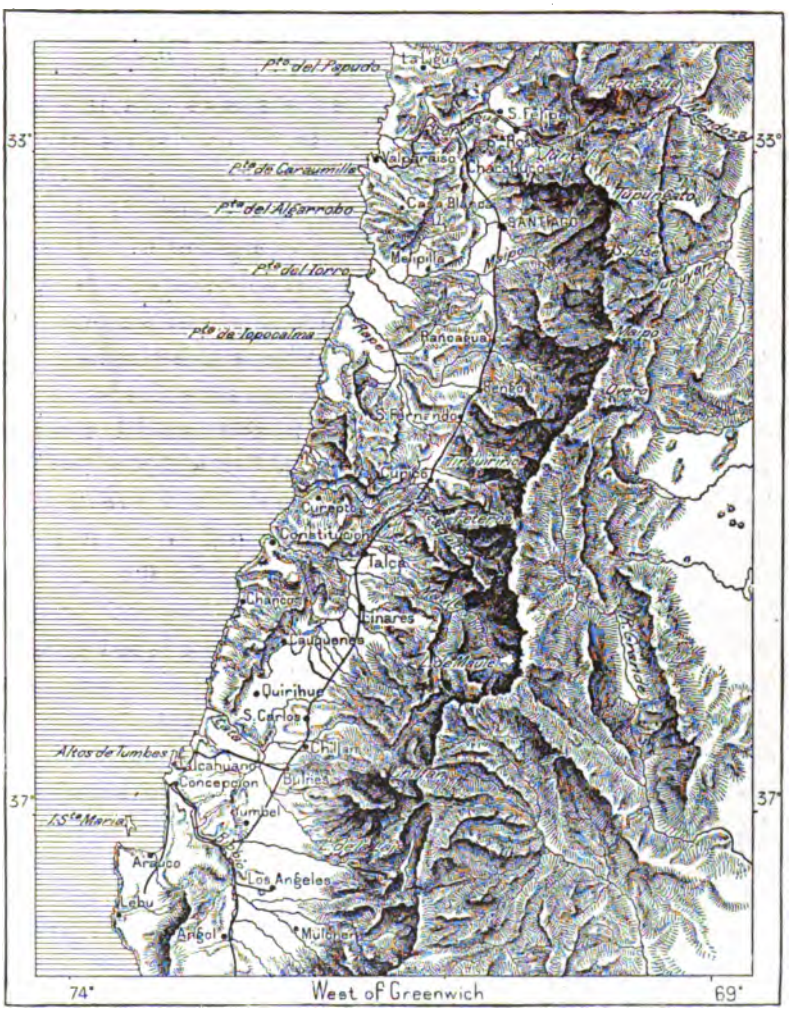
Punta Arenas is now a free port open to all nations. Fifteen other "habilitated" ports, that is, open to foreign trade, follow from north to south, the long list beginning with Arica, Pisagua, Iquique, Tocopilla, Antofagasta, Taltal, Caldera, Carrizal Bajo, Coquimbo and Valparaiso, and closing with Talcahuano, Coronel, Corral, Puerto Montt and Ancud. The passes across the Andes, where trade is carried on between Chili, Argentina and Bolivia, are also called "ports," as in the French Pyrenees. During the Spanish rule only one of these *puertos secos* ("dry ports") was frequented, that of Cumbre, between Santa Rosa and Uspallata; at present at least fifteen are utilised, and the number is yearly increasing.

Including vessels entering and clearing, the shipping averages about 20,000,000 tons a year, two-fifths flying the national, most of the rest the British flag. In 1886 the mercantile navy comprised nearly 200 vessels of all sizes, with a collective burden of over 86,000 tons. One-fifth of these are steamers plying along the Pacific seaboard between Panama in the north and Puerto Montt in the south. Various European companies also share in this traffic, by far the largest being the Pacific Steam Navigation Company, flying the British flag and owning a fleet with a total capacity of over 100,000 tons.

COMMUNICATIONS—PUBLIC INSTRUCTION.

In 1810 Chili had only one carriage-road, leading from Valparaiso to Santiago; at present both roads and railways are numerous. The line ascending the Aconcagua valley from Valparaiso to Santa Rosa de los Andes throws off a southern branch through Llai-Llai and over the Chacabuco Pass down to Santiago. From

Fig. 182.—CENTRAL VALLEY OF SOUTH CHILI.
Scale 1 : 5,000,000.



this point it is continued southward through the central Chilian plain, and has already penetrated into Araucania, where in 1892 Victoria was its most advanced station. Farther on the works are in progress right down to the mouth of the Rio Tolten, with various branch lines following between Valdivia and Puerto Montt. At the end of 1891 the total length of the system exceeded 680 miles, representing an outlay of £11,500,000. The whole system belongs to the Government, which has also acquired the Chañaral line in the northern mineral region.

All the other northern lines owe their existence to the mining industry, and are due to private enterprise. The most costly runs from Antofagasta up to the Bolivian plateaux, the section within Chilian territory being about 270 miles long. The nitrate lines terminating at Pisagua, Iquique and Patillos have a joint length of 240 miles; those of the Copiapo copper-mining district over 150 miles.

Since the late civil war, railway enterprise has received a fresh impulse, and the three lines have been taken in hand which are ultimately to cross the Andes in the north, centre and south, with terminal Chilian stations at Copiapo, Santa Rosa de los Andes and Yumbel, near Concepcion, respectively. But the greatest activity is concentrated on the trans-Andean trunk line, which is to connect Valparaiso with Buenos Ayres, and thus realise the scheme of a trans-continental railway projected by Wheelwright in 1863. In 1893 the whole line, 925 miles long, had been completed except a short section of 40 miles; but in this section occur the steepest gradients, the longest and most difficult tunnels. On the Chilian side, which is by far the more precipitous, an escarpment will have to be surmounted by means of a spiral tunnel making a complete letter-S twist, and steep inclines will have to be ascended by the ratchet system with a gradient of 8 in 100. Five tunnels follow in rapid succession, with a collective length of 14,300 yards, the last and longest (5,540 yards) piercing the Cumbre at an altitude of 10,430 feet in order to reach the Argentine slope. But financial disasters, strikes and mishaps of all kinds have retarded the undertaking, which, unless fresh funds can be raised, will scarcely be completed before the close of the century.

The telegraph system has also been rapidly developed in recent years, and in 1891 there was a total length of 13,730 miles, of which 8,000 were owned by the State. A telephone company had established apparatus in over forty towns of the republic, and more than 44,000,000 letters, papers and parcels had been forwarded through 514 district post-offices.

Chili is surpassed by Venezuela alone amongst the Andean States in the number of her educational establishments; but she greatly excels the rival republic in scientific and literary activity. The primary schools are attended by about 100,000 children, or a thirtieth of the whole population, while several small towns possess lyceums, colleges and other secondary schools. The University of Santiago comprises the same faculties as those of Europe, and schools of practical agriculture have been founded at Santiago, Tacna, Concepcion and elsewhere. But in Chili, as in Peru and Colombia, the educated youth devote their energies chiefly to law and the "political sciences"—in other words, to party politics and journalism.

The printing-press, first introduced in 1820, now issues over 200 periodicals, including 7 daily papers and 35 other journals in Santiago, and 16 in Valparaiso.

IX.

Administration.

The Chilian Constitution, several times modified by legal procedure and recently suspended by the civil war, dates from 1833. The State is declared to be a

republic, "one and indivisible," with legislative, executive, and judicial powers. The suffrage is limited to married men at least twenty-one years old, or celibates twenty-five years old, capable of reading and writing, owning some landed property, or exercising a lucrative trade or profession. Thus the lower orders are practically excluded, and in 1876 the electors numbered less than 50,000 in a total population of 2,140,000.

Congress comprises two chambers with legislative functions. The members of the Lower House are directly elected in the proportion of one for every 30,000 inhabitants, and are returned by the departments, whereas the Senate, three times less numerous, represents the provinces. The Lower House, which comprised 97 members in 1890, is completely renewed by the general elections held every three years, while half only of the senators retire.

Fig. 183.—Provinces of Chili.

Scale 1 : 37,000,000.

The President is elected for five years, by a body of delegates appointed for the purpose. He enjoys royal prerogatives, and appoints all the six ministers, as well as five of the eleven members of the Council of State, the other six being elected by Congress. He also nominates the magistrates for life and most of the higher officials; the civil administration of the departments and provinces depends directly on him; he commands the army, may suspend all personal guarantees in time of war, and even enjoys the right of presenting the names of persons to be nominated to the episcopacy by the Pope, and lastly, may prevent the publication of Papal bulls in the republic.

The judicial power comprises a supreme court of seven members, six courts of appeal, and secondary judges in the chief towns of the various departments and districts.

An article in the Constitution declares that "the religion of Chili is the Catholic, Apostolic and Roman, with exclusion of all other cults from the right of public worship." The private observance of these non-Roman rites was, however, expressly permitted by a special law passed in 1865. The influence of the Roman Church has greatly diminished since the frightful calamity of 1868, when over 2,000 women were burnt in the fire that broke out in the Jesuits' church during a public service. The clergy have been deprived of various privileges: they are excluded from the council of state; they no longer enjoy private jurisdiction, but are subject, like all other citizens, to the common

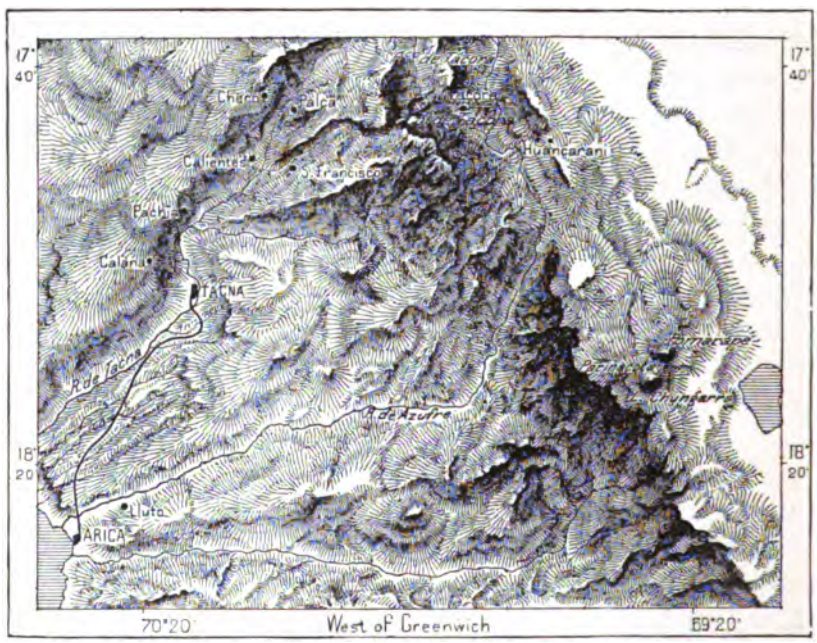
law in civil and criminal matters. Tithes are abolished, and schools, cemeteries and the registration of births and deaths have been removed from their control, while civil marriage was established in 1884. The Catholic Church, however, is still subsidised, and the country is officially divided into four dioceses, the archbishopric of Santiago and the bishoprics of Serena, Concepcion and Ancud, with the two vicariates of Tarapaca and Antofagasta.

The army is limited to a peace footing of 6,000; but the National Guard comprises all Chilians capable of bearing arms, and is expected to supply on a first requisition about 51,000 men. The fleet includes an ironclad of 6,900 tons, 31 other war vessels of all sizes, and 1,665 sailors and marines.

Since the action of the Dictator during the late war, Chili is encumbered with

Fig. 184.—The Disputed Territory of Arica and Tacna.

Scale 1 : 1,400,000.



a public debt, which in 1892 exceeded £4,400,000. The receipts, which nearly balance the expenditure, are derived chiefly from the customs, railway profits, sale of public lands, stamps and the land tax. Despite recent events the public credit is good, and the State is now withdrawing the paper money, which in 1892 exceeded £10,000,000. Pending the settlement of her claims against Peru, Chili enjoys the usufruct on the sale of the guanos on the Peruvian seaboard. She will also be entitled to a sum of £2,000,000 should the disputed province of Tacna decide by popular suffrage to transfer its allegiance from Chili to Peru.

The republic is divided administratively into provinces and departments, tabulated in the Appendix.

These political divisions vary immensely in extent and population, the latter being as a rule in inverse proportion to the former. Thus, about one-fourth of all the inhabitants of Chili are concentrated in the two central provinces of Santiago and Valparaiso, although their joint area is considerably less than one-fortieth of that of the whole republic. On the other hand Magellanes, by far the largest administrative division in extent (over 75,000 square miles), has scarcely the population of a good-sized village (about 3,000 in 1893). Hence this vast region at the southern extremity of Chili forms neither a province nor even a department, but only a *territory* without any representation in the national assembly, and according to the present Constitution it must continue unrepresented until it can show a population of 30,000.

Meanwhile the balance of political power, so far as it depends on the body of electors, is in a great measure held by the little central district in which are situated the capital, Santiago, and its port of Valparaiso. With a collective area of less than 7,000 square miles, this favoured district returns as many as twenty deputies to the Lower House, which in 1891 comprised not more than ninety-seven members altogether.

APPENDIX.

STATISTICAL TABLES.

SOUTH AMERICA.

Area with adjacent islands, 6,740,000 sq. miles.
Extreme length, 4,500 miles; extreme breadth, 3,100 miles; coastline, 18,000 miles.
Population: (1810) 8,350,000; (1892) 37,225,000.

PROGRESS OF THE SOUTH AMERICAN STATES, 1810 TO 1892.

	Population.		Trade.	
	1810.	1892.	1810.	1892.
Venezuela	800,000	2,200,000	£400,000	£7,000,000
Colombia	1,000,000	4,200,000	400,000	6,000,000
Ecuador	400,000	1,260,000	200,000	3,000,000
Peru	1,100,000	3,000,000	2,000,000	14,000,000
Bolivia	800,000	1,450,000		3,000,000
Chili	700,000	3,300,000	400,000	26,000,000
Argentina	400,500	4,000,000	1,000,000	32,000,000
Paraguay	100,000	400,000		1,000,000
Uruguay	50,000	750,000		20,000,000
Brazil	2,800,000	16,000,000	4,000,000	64,000,000
British Guiana	100,000	290,000	1,600,000	4,000,000
Dutch Guiana	40,000	70,000		800,000
French Guiana, with Cunani	20,000	30,000		600,000
British Islands (Trinidad, Tobago)	25,000	235,000	600,000	4,410,000
Dutch Islands, Curaçao, &c.	15,000	40,000		480,000
Totals	8,350,000	37,225,000	£10,600,000	£186,690,000

ISLANDS ON THE VENEZUELAN COAST.

BRITISH ISLANDS.

	Area in sq. miles.	Population (1891).
Tobago	114	18,337
Trinidad	1,754	200,030

Land under cultivation in Trinidad: 194,000 acres (52,000 sugar; 43,000 cacao and coffee; 18,000 ground provisions).

Chief Towns:—Port of Spain, population, 32,000; San Fernando, population, 6,340.

	Revenue.	Expenditure.	Exports.	Imports.
Trinidad (1891) . .	£488,000	£490,000	£2,059,000	£2,097,000
Tobago (1891) . .	8,700	8,700	24,000	24,000

DUTCH ISLANDS.

	Area in sq. miles.	Population (1890).
Curaçao	220	26,000
Buenaire	214	4,900
Aruba	66	7,800
Total . . .	500	38,700

VENEZUELAN ISLANDS.

	Area in sq. miles.	Population.
Margarita, Cubagua, Tortuga	470	40,000
Orchilla, Aves, &c.	170	40
Total . . .	640	40,040

VENEZUELA.

STATES.

	Area in sq. miles.	Population, 1891.
Federal District	45	89,133
Miranda	33,969	484,509
Carabobo	2,984	198,021
Bermudez	32,243	300,597
Zamora	25,212	246,676
Lara	9,296	246,760
Los Andes	14,719	336,146
Falcon and Zuila	36,212	224,566
Bolivar	88,701	50,289

TERRITORIES.

Goajira	3,608	65,990
Alto Orinoco	119,780	45,197
Amazonas	90,928	
Colon	166	129
Yuruauri	81,123	22,392
Caura	22,564	—
Armistico	7,046	
Delta	25,347	7,222
Total of States and Territories .	593,943	2,323,527

CHIEF TOWNS OF VENEZUELA, WITH ESTIMATED POPULATIONS.

Caracas	75,000	Maturin	10,000
Valencia	40,000	Tocuyo	10,000
Maracaibo	35,000	Maracai	7,500
Barsiquimeto	15,000	Nirgua	7,000
La Guaira	12,000	Parapara	7,000
Puerto Cabello	11,000	Cumana	6,500
Ciudad Bolivar	11,000	Turmero	6,000
Barcelona	10,000	Carora	6,000

CHIEF TOWNS OF VENEZUELA, WITH ESTIMATED POPULATIONS—*continued.*

Calabozo	5,600	Varinas	3,000
Merida	5,000	Valera	3,000
Coro	5,000	Quibor	3,000
Victoria	5,000	Guacipati	3,000
Guanare	4.600	San Fernando de Apure	3,000
La Grita	4,000	Tovar	2,500
Ortiz	4,000	Trujillo	2,500
San Cristobal	3,500	Capatarida	2,000
San Carlos	3,000	San Fernando de Atabapo	500

ESTIMATED POPULATION OF VENEZUELA AT VARIOUS DATES.

1839, according to A. Codazzi	945,000
1854, official estimate	1,564,000
1873, ,, ,,	1,784,000
1892, ,, ,,	2,238,900

Vital Statistics (1889): Births, 76,187; deaths, 55,213; increase, 20,969.
Total increase for the five years from 1883 to 1887, 159,140; or a yearly average of nearly 32,000.

LIVESTOCK OF VENEZUELA IN 1875 AND 1888.

	1875.	1888.
Horned Cattle	1,390,000	8,476,000
Sheep and Goats	1,128,000	5,727,000
Pigs	362,000	1,940,000
Horses	93,000	388,000
Mules	47,000	300,000
Asses	281,000	859,000
Total	3,301,000	17,690,000

PUBLIC AND PRIVATE DOMAINS IN SQUARE MILES (1891).

	Public.	Private.	Total.
Agricultural	87,236	47,626	134,862
Pastoral	57,900	98,430	156,330
Forest	298,273	4,700	302,973
Total	443,409	150,756	594,165

OUTPUT OF THE VENEZUELAN MINES (1886).

Gold, £803,000; copper, £165,000; total, £968,000.

FOREIGN TRADE OF VENEZUELA (1888).

	Imports.	Exports.	Total.
United States	£780,000	£1,830,000	£2,610,000
Great Britain	940,000	132,000	1,072,000
France	510,000	620,000	1,130,000
Germany	540,000	400,000	940,000
Other Countries	400,000	410,000	810,000
Total	£3,170,000	£3,392,000	£6,562,000
Total (1891)	£4,050,000	£3,000,000	£7,050,000

Coasting trade (1888), £3,720,000.
Railways open (1891), 282 miles; projected, 1,240,000 miles.
Post Office returns (1890): letters, &c., forwarded, 6,412,000.
Telegraph lines, 3,528 miles; despatches, 420,000.
Telephone instruments, 776; subscribers, 1,477.
Primary schools, 1,990; attendance, 102,200.
Attendance at secondary and higher schools, 4,784.
Revenue (1890): customs, £1,340,000; total, £1,800,000.

Average expenditure, £1,400,000.
Internal and external consolidated debt (1890), £4,530,000.
Regular forces: 5,760 of all arms; national militia, 60,000.

TRADE AND SHIPPING RETURNS.

La Guaira (1891): total exchanges, £2,300,000. Shipping entered and cleared, 500,000 tons.
Puerto Cabello (1891): exchanges, £1,400,000.
Vela de Coro (1889): exports, £120,000.
Ciudad Bolivar (1889): total exchanges, £680,000.

COLOMBIA.

Departments.	Provinces.	Area in sq. miles.	Population (est.).
Magdalena	Banco, Cienaga, Padilla, Valle de Upar	24,440	125,000
Bolivar	Barranquilla, Cartagena, Corozal, Lorica, Mompos, San Andres	21,345	350,000
Panama	Azuero, Chiriqui, Coclé, Colon, Panama, Veraguas, Balboa, Bocas del Toro, Darien	31,571	315,000
Boyaca	Norte, Nord-este, Gutierez, Centro, Oriente, Occidente, Tundama, Casanare	33,351	645,000
Santander	Charala, Cucuta, Garcia Rovira, Guanenta, Ocaña, Pamplona, Socorro, Soto; Velez, Bolivar	16,409	600,000
Cundinamarca	Oriente, Ubate, Zipaquira, Bogota, Facatativa, Tequendama, La Palma, San Martin	79,810	595,000
Tolima	Norte, Centro, Sur	18,069	353,000

Departments.	Provinces.	Area in sq. miles.	Population (est.).
Antioquia	Norte, Nord-este, Occidente, Cauca; Centro, Oriente, Sud-Oeste; Sur, Sopetran	22,316	560,000
Cauca	Atrato, Barbacoas, Buenaventura, Buga; Caldas, Cali; Obando, Palmira; Pasto, Popayan, Quindio, Santander, San Juan; Toro, Tulua; Caqueta, Tuquerres	257,462	700,000
	Total	504,773	4,243,000

Estimated population : (1870) 2,951,000; (1881) 3,878,000.

CHIEF TOWNS OF THE DEPARTMENT OF MAGDALENA.

	Population.		Population.
Cienaga	7,200	Banco	1,700
Santa Marta	5,000	Valle de Upar	1,400
Rio Hacha	4,000	Tamalameque	1,000
Villanueva	2,400		

CHIEF TOWNS OF THE DEPARTMENT OF BOLIVAR.

	Population.		Population.
Barranquilla	15,000	Magangue	4,000
Cartagena	12,000	Since	4,000
Sabanalarga	10,000	Chinu	3,600
Sincelejo	9,000	Corozal	3,600
Carmen	7,500	Lorica	3,000
Mompos	6,000	Calamar	2,000

CHIEF TOWNS OF THE DEPARTMENT OF BOYACA.

	Population with District.		Population with District.
Chiquinquira	18,000	Santa Rosa	9,000
Soata	17,500	Cocui	9,000
Sogamoso	14,000	Guateque	9,000
Moniquira	13,000	Saboya	9,000
Pesca	12,500	Guayata	8,500
Duitama	12,000	Ramiriqui	8,500
Miraflores	12,000	Tunja	8,000
Paipa	12,000	Caldas	7,000
Turmeque	11,000	Labranza Grande	7,000
Chita	10,000	Boyaca	7,000
Jenezano	10,000	Muso	5,000

CHIEF TOWNS OF THE DEPARTMENT OF SANTANDER.

	Population with District.		Population with District.
Socorro	20,000	Puente Nacional	16,000
Jesus Maria	18,000	Velez	15,000
Bucaramanga	17,000	Sanjil	14,000

CHIEF TOWNS OF THE DEPARTMENT OF SANTANDER—*continued.*

	Population with District.		Population with District.
Cucuta	13,000	Suaita	10,000
Jiron	12,500	Mogotes	9,000
San Andres	12,000	Ocaña	8,000
Piedecuesta	12,000	Zapatoca	8,000
Barichara	11,000	Salazar	7,500
Charala	11,000	Malaga	7,500
Pamplona	11,000	Rosario	6,000
Onzaga	11,000	Concepcion	6,000

CHIEF TOWNS OF THE DEPARTMENT OF CUNDINAMARCA.

	Population with District.		Population with District.
Bogota	110,000	Guatavita	7,000
La Mesa	14,000	Tocaima	7,000
Zipaquira	12,000	Pacho	7,000
Guaduas	11,000	Gacheta	6,500
Anolaima	10,500	Villeta	6,000
La Palma	10,000	Guasca	5,000
Choconta	10,000	Nemocon	5,000
Fomeque	9,000	Funza	3,000
Junin	9,000	Pandi	2,500
Fusagasuga	8,000	Fontibon	2,500
Caqueza	8,000	Girardot	2,000
Ubate	8,000	Fuquene	1,500
Facatativa	7,500	Villavicencio	1,000

CHIEF TOWNS OF THE DEPARTMENT OF TOLIMA.

	Population with District.		Population with District.
Neiva	15,000	Natagaima	9,000
Ibague	13,000	Ambalema	8,000
Guamo	12,000	Melgar	6,000
Purificacion	11,000	Honda	5,000
Espinal	10,000	Timana	5,000
Ortega	10,000	La Plata	4,000
Chaparral	9,000	Mariquita	3,000
Guayapal	9,000	San Agustin	1,000

CHIEF TOWNS OF THE DEPARTMENT OF ANTIOQUIA.

	Population.		Population.
Medellin	37,000	Antioquia	8,800
Manizales	14,600	Abejorral	8,100
Sonson	14,000	Neira	8,000
Rionegro	11,800	Sopetran	7,900
Jerico	11,600	Amalfi	6,600
Aguadas	11,300	Envigado	6,500
Fredonia	10,400	Itagui	6,500
Santa Rosa de los Osos	10,000	Remedios	6,400
Yarumal	10,000	Amaga	6,400
Titiribi	9,200	Marinilla	5,600
Salamina	9,100	Zaragoza	2,100

CHIEF TOWNS OF THE DEPARTMENT OF CAUCA.

	Population with District.		Population with District.
Cali	16,000	Novita	8,000
Palmira	15,000	Bando	8,000
Pasto	13,000	Quibdo	7,000
Ipiales	13,000	Cumbal	6,500
Buga	12,500	Almaguer	6,500
Popayan	10,000	Barbacoas	6,000
Cartago	9,500	Buenaventura	5,000
Tuquerres	8,500	Iscuande	5,000

FOREIGN TRADE OF COLOMBIA (1890).

	Imports.	Exports.	Total.
Great Britain	£960,000	£930,000	£1,890,000
France	390,000	1,060,000	1,450,000
United States	490,000	360,000	850,000
Germany	300,000	280,000	580,000
Total	2,140,000	2,630,000	4,770,000

Total exchanges with Great Britain (1891): £1,600,000.

SHIPPING RETURNS (1889).

	Sailing-vessels.	Tonnage.	Steamers.	Tonnage.
Entered	933	41,920	589	772,930
Cleared	924	39,746	583	771,679

Total entered: 1,522 vessels; 814,850 tonnage.
„ cleared: 1,507 „ 811,425 „
Total 3,029 „ 1,626,275 „

Total entered (1890): 1,022 vessels; 801,858 tonnage.

Cucuta (1889):—Imports, £200.000; exports, £692,000.
Coffee exported: Colombian, 5,569 tons; Venezuelan, 4,937 tons; total, 10,506 tons.
Barranquilla (1889):—Imports, £1,470,000; exports, £1,970,000; total, £3,440,000.
Shipping entered, 240; tonnage, 368,000.
„ cleared, 231; „ 364,000.
Rio Hacha (1889): Imports, £25,000; exports, £54,000; total, £79,000.
Santa Marta (1889): Foreign exchanges, £8,000; shipping, 105,000 tons.
Cartagena (1889):—Imports, £400,000; exports, £367,000; total, £767,000.
Shipping, 470 vessels; 603,346 tonnage.
Buenaventura (1889):—Imports, £128,000; exports, £100,000; total, £228,000.
Shipping, 141 vessels; 72,689 tonnage.
Tumaco (1889): Foreign exchanges, £44,000; shipping, 78,000 tons.
Rio Magdalena: Average yearly traffic, £7,000,000; tonnage, 50,000.

FINANCE.

	1890.	1892.	1893.
Revenue	£4,000,000	£4,070,000	£4,980,000
Expenditure	4,300,000	4,800,000	5,460,000

External debt (1892), £1,913,500; arrears of interest, £1,146,485; total, £3,059,985.

PUBLIC INSTRUCTION (1891).

Primary schools, 1,822: pupils, 114,331; attendance, 91,976.
Normal schools, colleges, &c.: 14; students, 587.
Universities (Bogota, Cartagena, and Popayan): students, 755.

Railways (1890): 218 miles completed; 150 miles in progress.
Post Office returns (1891): 2,592,000 letters, &c., forwarded.
Telegraph: 6,016 miles; 273 stations; 505,000 despatches.

ECUADOR.

Provinces.	Districts.	Area in sq. miles.	Population (est.).
Carchi	Tulcan	15,000	36,000
Imbabura	Ibarra, Otavalo, Cotocache	2,100	67,940
Pichincha	Quito, Cayambe, Mejia	6,400	205,000

Provinces.	Districts.	Area in sq. miles.	Population (est.).
Leon	Latacunga, Pujili	2,700	109,600
Tunguragua	Ambato, Pillaro, Pelileo	1,700	103,033
Chimborazo	Riobamba, Alausi, Guano, Colta, Sangay	3,100	122,300
Cañar	Guaranda, Chimbo, San Miguel	1,600	64,014
Azuay	Cuenca, Gualaceo, Paute, Giron, Gualaquiza	4,000	132,400
Loja	Loja, Zaraguro, Celica, Paltas, Calvas	3,800	66,456
Esmeraldas	Esmeraldas	5,600	14,553
Los Rios	Baba, Vinces, Pueblo Viejo	2,400	32,800
Manabi	Puerto Viejo, Jipijapa, Montecristi, Rocafuerte, Sucre, Santa Ana	8,000	64,123
Guayas	Guayaquil, Santa Elena, Daule, Olmedo	8,500	98,042
Oro	Machala, Santa Rosa, Yaruma	2,400	32,600
Oriente	Napo, Canelos, Gualaquiza, Zamora	100,000	80,000
Galapagos		3,200	—
	Total	157,000	1,271,861

POPULATION OF ECUADOR ACCORDING TO RACES.

Whites and Cholos (half-caste Whites and Indians)	500,000
Full-blood Indians, settled and baptized	500,000
Full-blood Indians, Nomad and Pagan	105,000
Zambos (White and Black, Indian and Black, and all other Half-castes)	40,000
Full-blood Africans	10,000
Total	1,155,000

CHIEF TOWNS OF ECUADOR.

	Population.		Population.
Guayaquil	45,000	Riobamba	12,000
Quito	35,000	Loja	9,000
Cuenca	25,000	Ambato	8,000
Latacunga	12,000	Jipijapa	6,000

CHIEF TOWNS OF ECUADOR—*continued.*

	Population.		Population.
Puerto Viejo	5,000	Azoques	4,000
Ibarra	5,000	Guaranda	4,000
Cotocachi	4,500	Tulcan	4,000
Guano	4,500	Machala	3,000
Otavalo	4,000	Babahoyo	3,000
Alausi	4,000		

FOREIGN TRADE OF ECUADOR (1891).

	Imports.	Exports.	Total.
France	£500,000	£360,000	£860,000
Great Britain	360,000	200,000	560,000
Germany	200,000	210,000	410,000
United States	500,000	200,000	700,000
Peru	100,000	40,000	140,000
Chili	50,000	80,000	130,000
Spain	36,000	12,000	48,000
Colombia	9,000	8,000	17,000
Total	£1,745,000	£1,110,000	£2,865,000

CHIEF EXPORTS:—Cocoa, £900,000; coffee, £140,000; gold and silver, £100,000; rubber, £80,000; hides, £20,000; sugar, £31,000.

CHIEF IMPORTS:—Textiles, £400,000; provisions, £200,000; hardware, £40,000.

SHIPPING RETURNS (1891).

	Entered.		Cleared.	
	Vessels.	Tonnage.	Vessels.	Tonnage.
National	176	8,400	182	8,600
British	307	249,057	303	241,400
Foreign	123	116,120	130	106,000
Total	606	373,577	615	456,000

Guayaquil (1890):—Total exchanges, £2,400,000. Shipping, 896 vessels; tonnage, 642,000.

FINANCE.

Revenue (1892): Customs, £386,000; total, £572,000.
Expenditure (1892): Charges on debt, £114,300; total, £602,000.
Public Debt (1892): External, £750,000; internal, £1,000,000; total, £1,750,000.

Regular forces, 3.350; National Guard, 30,000.
Railway, Duran-Chimbo line, 63 miles.
Primary and other schools, 866; attendance, 58,000.
University (Quito): staff, 24; students, 116.

GALAPAGOS ISLANDS.

	Area in sq. miles.
Albemarle	1,710
Indefatigable	400
Narborough	260
James (Santiago)	250
Chatham	270
Floreana	50
Other islands and islets	230
Total	3,170

PERU.

Departments.	Provinces.	Area in sq. miles.	Population.
Piura	Tumbez, Paita, Ayabaca, Piura, Huancabamba	13,931	155,502
Lambayeque	Lambayeque, Chiclayo	17,939	85,984
Libertad	Pacasmayo, Pataz (Parcoy), Huanachuco, Otusco, Trujillo	15,649	147,541
Ancachs	Pallasca, Pomabamba, Huaylas, Santa, Huari, Huaraz, Cajatambo	17,405	284,091
Lima	Canta, Chancay, Huarochiri, Lima, Yauyos, Cañete	14,560	226,922
Callao		200	34,492
Ica	Chincha (Pisco), Ica	6,295	60,111
Arequipa	Union, Cayllonia, Castilla, Condesuyos, Camana, Arequipa, Islay	27,744	160,282
Moquegua	Moquegua	22,516	28,786
Cajamarca	Jaen, Chota, Hualgayoc, Cajamarca, Celindin, Cajabamba, Contumaza	14,188	213,391
Amazonas	Bongara, Chachapoyas, Luya	14,129	34,245
Huanuco	Huamalies, Huanuco, Dos de Mayo	11,000	78,856
Junin	Pasco, Tarma, Jauja, Huancayo	22,822	209,871
Huancavelica	Tayacaja, Angaraes, Huancavelica, Castrovireina	10,814	104,155

Departments.	Provinces.	Area in sq. miles.	Population.
Ayacucho	Huanta, La Mar, Huamanga, Cangallo, Parinacochas, Lucanas	24,213	142,205
Cuzco	Convencio (Santa Ana), Paucartambo, Urubamba, Calca, Quispitanchi, Cuzco, Anta, Paruro, Acomayo, Canchis (Sicuani)	95,647	238,445
Apurimac	Andahuaylas, Cotabambas, Abancay, Aymaraes, Antabamba	62,325	119,246
Loreto	Bajo Amazonas, Alta Amazonas, Moyobamba, Huallaga, San Martin	32,727	61,125
Puno	Azangaro, Carabaya, Huancane, Lampa, Chucuito	39,743	256,594
	Total	463,747	2,621,844
Uncivilised and semi-independent Indians			350,000
Total estimated population (1892)			2,971,844

	Sq. miles.
Area of Peru before the war with Chili	514,000
Area of Tarapaca and Tacna ceded to Chili	50,000
Present area of Peru	464,000

CHIEF TOWNS OF PERU ON THE PACIFIC SLOPE.

	Population.		Population.
Lima	101,488	Coracora	4,431
Callao	35,492	Pampa-colca	4,352
Arequipa	29,237	Chorrillos	4,329
Chiclayo	11,325	Huacho	3,972
Monsefu and Eten	10,833	Yungay	3,750
Trujillo	7,538	Moquegua	3,581
Ferriñafe	7,043	Morrope	3,407
Ica	6,906	San Padro de Lloc	3,320
Piura	6,811	Paita	2,396
Lambayeque	6,248	Caraz	2,387
Motupe	4,861	Pisco	2,348
Huaraz	4,851	Tumbez	1,851
Camana	4,658	Mollendo	1,434

CHIEF TOWNS OF PERU IN THE AMAZONIAN AND TITICACA BASINS.

	Population.		Population.
Cuzco	18,970	Iquitos	8,000
Ayacucho	9,387	Cajamarca	7,225

CHIEF TOWNS OF PERU IN THE AMAZONIAN AND TITICACA BASINS—*continued.*

	Population.		Population.
Moyobamba	7,103	Chachapoyas	3,366
Cerro de Pasco	7,000	Lamas	3,135
Huanuco	5,263	Jauja	2,806
Tarapoto	4,740	Puno	2,729
Maras	4,421	Andahuaylas	2,388
Huancayo	4,089	Sicuani	2,290
Santiago de Chuco	3,904	Chasuta	2,021
Huancavelica	3,937	Hualgayoc	1,914
Tarma	3,834	Jeberos	1,733
Huanta	3,739	Cangallo	1,703

FOREIGN TRADE OF PERU (YEARLY AVERAGE).

Total Imports, £2,000,000; Imports from Great Britain, £1,000,000.
Total Exports, £1,500,000; Exports to Great Britain, £1,200,000.

Total Exchanges £3,500,000 Total £2,200,000.

	1887.	1889.	1891.
Exports to Great Britain	£1,640,000	£1,294,000	£970,000
Imports from Great Britain	717,000	960,000	1,040,000

GUANO EXPORTED TO GREAT BRITAIN.

	1876.	1883.	1891.
Tons	157,000	14,000	3,800
Value	£1,966,000	£122,000	£16,000

NITRATES EXPORTED TO GREAT BRITAIN.

	1887.	1889.	1891.
Cwts.	1,356,000	75,000	70,000
Value	£642,000	£36,000	£29,000

MINING INDUSTRIES.

Total yield of silver (1888): 280,000 lbs.; value, £1,040,000.

Mines open (1891): 4,187, of which 2,641 silver, 427 gold, 46 gold and silver, 18 silver and copper, 25 silver and lead, zinc or quicksilver, 28 copper, 20 quicksilver, 613 petroleum, 278 coal, 60 salt, 14 sulphur, 17 sundries.

Capital (mostly British) invested in mining and associated industries (1889-91), £8,350,000.

Average coca crop, 12,000,000 to 14,000,000 lbs.; value, £240,000 to £300,000. Sugar exported (1890), £412,000; alpaca, £252,000.

Paita (1890): Total exchanges, £610,000.

Callao (1889):—Customs receipts, £656,000. Shipping entered and cleared, 653 steamers, of 816,896 tons; 1,890 sailing-vessels of 237,063 tons; total, 2,543 vessels, 1,053,959 tonnage.

Mollendo (1890): Shipping, 606 vessels; 805,000 tonnage.

Iquitos (1891):—Customs receipts, £25,000. Average exchanges, £240,000 to £400,000.

FINANCE (1892).

REVENUE.		EXPENDITURE.	
Customs	£1,072,000	Congress	£61,000
Taxes	243,000	Government	199,000
State Property	12,000	Foreign Affairs	42,000
Telegraphs	5,000	Justice	150,000
Posts	37,000	Army and Navy	660,000
Various	52,000	Sundries	300,000
Total	£1,421,000	Total	£1,412,000

Public Debt, internal (1889)	£22,000,000
Unredeemed paper money	17,000,000
Total	£39,000,000

EXTERNAL DEBT CONTRACTED IN ENGLAND.

Railway 6 per cent. loan (1870)	£11,142,000
Railway 5 per cent. loan (1872)	20,438,000
Accumulated arrears of interest (1890) . . .	23,000,000
Total . .	£54,580,000

NOTE.—"In January, 1890, what is known as the Grace-Donoughmore Contract was finally ratified. By this the English Council of Foreign Bondholders releases Peru of all responsibility for the 1870 and 1872 debts, on condition that the bondholders have ceded to them all the railways, guano deposits, mines and lands of the State for 66 years. The bondholders undertake to complete and extend the existing railways."—*Statesman's Year Book*, 1893, p. 822.

Railways open (1892):—State, 760 miles; private, 122 miles; total, 882 miles. Total cost of construction, £36,000,000; gross receipts (1892), £348,500; expenses, £215,000.

State telegraph lines (1892), 1,080 miles.

Post Office (1890): Letters, parcels, &c., forwarded, 937,300.

BOLIVIA.

Departments.	Provinces.	Area in sq. miles.	Pop. 1888 (est.).
LA PAZ . . .	Muñecas, Omasuyos, Ingavi, La Paz, Sicasica, Larejaca, Yungas, Inquisivi	171,200	346,139
OBURO . . .	Caraugas, Oruro, Paria	21,331	111,372
POTOSI . . .	Porco, Lipez, Potosi, Chayanta, Chicas	52,084	237,755
COCHABAMBA . .	Tapacari, Arque, Cochabamba, Cliza, Mizque, Ayopaya	21,417	196,766
BENI . . .	Caupolican, Mojos, Yuracares	100,551	16,744
SANTA CRUZ . .	Santa Cruz, Valle Grande, Cordillera	126,305	97,185
CHUQUISACA . .	Yamparaez, Tomina y Azero, Cinti	39,871	123,347
TARIJA . . .	Tarija, Concepcion, Salinas	34,599	62,854
	Total . . .	567,360	1,192,162

ESTIMATED POPULATION OF BOLIVIA (1893).

Half-caste Whites and Aborigines	800,000
Whites and recent immigrants	500,000
Full-blood Indians, nomad and settled	1,000,000
Total	2,300,000

CHIEF TOWNS OF BOLIVIA.

	Population.		Population.
La Paz	45,000	Tarija	6,000
Sucre (Chuquisaca)	26,000	Corocoro	4,000
Cochabamba	19,500	Tupiza	3,500
Potosi	12,000	Cinti	2,000
Santa Cruz de la Sierra	10,300	Trinidad	1,800
Oruro	10,000	Sorata	1,200
Huanchaca	8,000		

TRADE RETURNS.

Average annual value of imports	£1,200,000
Average annual value of exports	1,800,000
Total yearly exchanges about	£3,000,000

	1886.	1887.	1888.
Exports to Great Britain	£190,620	£145,950	£142,550
Imports from Great Britain	53,600	84,600	111,000.
Total exchanges with Great Britain	£244,220	£230,550	£253,550

MINING RETURNS.

Huanchaca silver-mines (1890): Ores, £900,000; net value, £520,000. Total net value of output (1877-1890), £5,200,000.

Tipuani gold-mines: total yield (1818-1868), £2,000,000.

Total output of all the Bolivian mines (1890), £2,300,000.

Coca crop (1885), £340,000; other agricultural produce, £3,200,000.

FINANCE.

Revenue (1891), £400,000; expenditure, £448,000.

Public debt: internal, £890,000; external, £124,000; total, £1,014,000.

Primary schools (1890), 493; attendance, 24,200.

Secondary schools (1890), 16; pupils, 2,126.

Universities (1890), 5; students, 1,384.

Army (peace footing), 2,000.

CHILI.

Provinces.	Departments.	Area in sq. miles.	Pop. (est.) 1891.
Tacna	Tacna	8,685	31,303
Tarapaca	Tarapaca, Pisagua	19,300	47,750
Antofagasta	Antofagasta, Tocopilla, Taltal	60,968	35,851

Provinces.	Departments.	Area in sq. miles.	Pop. (est.), 1891.
ATACAMA	Copiapo, Freirina, Vallenar, Chañaral	43,180	68,855
COQUIMBO	Serena, Illapel, Combarbala, Ovalle, Puerto de Coquimbo, Elqui	12,905	191,901
ACONCAGUA	San Felipe, Andes, Putaendo, Ligua, Petorca	5,840	153,049
VALPARAISO	Valparaiso, Casablanca, Limache, Quillota	1,637	221,788
SANTIAGO	Santiago, Victoria, Melipilla	5,223	383,609
O'HIGGINS	Rancagua, Cachapoal, Maipo	2,524	92,063
COLCHAGUA	San Fernando, Caupolican	3,795	161,788
CURICO	Curico, Vichuquen	2,913	104,909
TALCA	Talca, Curepto, Lontue	3,678	152,719
LINARES	Linares, Parral, Loncomilla	3,488	110,652
MAULE	Cauquenes, Itata, Constitucion	2,930	127,771
CHILLAN (NUBLE)	Chillan, Yungay, Bulnes, San Carlos	3,556	161,689
CONCEPCION	Concepcion, Lautaro, Talcaguano, Yumbel, Pachacay, Coelemu	3,535	223,850
ARAUCO	Lebu, Cañete, Arauco	4,248	86,236
BIOBIO	Angeles, Nacimiento, Mulchen	4,158	125,582
MALLECO	Angol, Traiguen, Collipulli	2,856	69,892

Provinces.	Departments.	Area in sq. miles.	Pop. (est.), 1891.
Cautin	Temuco	3,126	42,411
	Imperial		
Valdivia	Valdivia	8,315	60,437
	Union		
Llanquihue	Melipulli	7,823	74,818
	Carelmapu		
	Osorno		
Chiloe	Ancud	3,995	79,514
	Castro		
	Quinchao		
Magellanes (Territory)		75,292	3,111
	Total	293,970	2,817,552

Area of Chili: (1880) 120,000 sq. miles; (1881) 196,000 sq. miles; (1892) 294,000 sq. miles.
Estimated population of Chili (1892), 3,270,000.
Immigration (1889): 9,660, chiefly Italians and Germans.

CHIEF ETHNICAL ELEMENTS OF CHILI.

Hispano-Americans	3,000,000
Full-blood Indians (Araucanians, Fuegians)	50,000
European immigrants (Germans, Italians, French, English)	50,000
American immigrants (Peruvians, Bolivians, Argentines)	160,000
Sundries (Chinese, &c.)	10,000
Total	3,270,000

CHIEF TOWNS OF CHILI.

	Municipal Population.		Municipal Population.
Santiago	237,000	Angol	19,000
Valparaiso	115,000	Coquimbo	16,000
Concepcion	40,000	Parral	32,000
Talca	70,000	Rancagua	35,000
Chillan	61,000	Rengo	76,000
Serena de Coquimbo	37,000	Tomé	33,000
Iquique	33,000	Ovalle	61,000
Tacna	21,000	Valdivia	24,000
San Felipe de los Andes	35,000	San Bernardo	38,000
Curico	59,000	Vallenar	16,000
Copiapo	28,000	Taltal	13,000
Quillota	49,000	Illapel	32,000
Angeles	51,000	Pisagua	12,000
Mulchen	34,000	Arica	9,000
Linares	45,000	Ancud	25,000
Antofagasta	17,000	Talcahuano	7,000
San Carlos	40,000	Santa Rosa	34,000
San Fernando	80,000	Puerto Montt	16,000
Cauquenes	46,000	Tocopilla	5,000
Constitucion	32,000	Punta Arenas	2,100
Limache	25,000		

SHIPPING OF CHILI (1889).

	Tonnage.	Vessels.
Entered	11,109	9,723,998
Cleared	11,286	10,174,173
Totals	22,395	19,898,171

Total value of exports of Chili (1890)	£19,200,000
,, ,, ,, imports ,, ,, ,, ...	18,250,000
Total exchanges (1890) . . .	£37,450,000

VALPARAISO: SHIPPING 1890 AND 1891.

		Vessels.	Tonnage.
1890:	Entered	1,267	1,204,145
	Cleared	1,270	1,203,077
	Totals . . .	2,537	2,407,222
1891:	Entered	1,048	945,523
	Cleared	1,029	910,260
	Totals . . .	2,077	1,855,783

ARICA (1889):—Imports, £600,000; exports, £1,300,000; total, £1,900,000.

	Vessels.	Tonnage.
Shipping entered	585	536,593
,, cleared	569	523,064
Totals . . .	1,154	1,059,657

IQUIQUE (1887):—Imports, £1,125,000; exports, £3,700,000; total, £4,825,000.

	Vessels.	Tonnage.
Shipping entered	270	319,345
,, cleared	394	445,355
Totals . . .	664	764,700

PISAGUA (1887):—Imports, £230,000; exports, £3,000,000; total, £3,230,000.

	Vessels.	Tonnage.
Shipping entered	154	181,222
,, cleared	365	375,403
Totals . . .	519	556,625

Cobija and Tocopilla: Average annual exchanges, £1,200,000. Shipping: 550 vessels; 5,200,000 tonnage.

Antofagasta (1889): Imports, £275,000; exports, £506,000; total, £781,000.

Taltal (1889): Imports, £120,000; exports, £500,000; total, £620,000. Shipping (1891): 725 vessels; 749,476 tonnage.

Copiapo: Average annual yield of silver ores, £1,200,000.

Caldera: Average annual exchanges, £2,400,000 to £3,200,000. Shipping: over 1,000 vessels; 1,000,000 tonnage.

Coquimbo (1889): Imports, £400,000; exports, £600,000; total, £1,000,000. Shipping: 454 vessels; 468,340 tonnage.

Talcahuano (1889): Total value of exchanges, £1,580,000. Shipping: 1,310 vessels entered and cleared; tonnage, 1,223,800.

Corral: Average annual exchanges, £600,000; average annual tonnage, 300,000.

MINING RETURNS.

Yield of gold (1888), 5,400 lbs.; value, £342,000.
Total yield of gold (1550-1888), £40,000,000.
Yield of silver (1888), 434,000 lbs.; value, £1,200,000.

Yield of copper (1888), 31,240 tons; value, £2,600,000.
Yield of coal (1890), 580,000 tons; value, £240,000.
Yield of nitrates (1888), 784,250 tons; value, £6,800,000.

TRADE RETURNS.

Imports, 1889.		Exports, 1889.	
Textile Fabrics	£2,150,000	Nitrates	£6,000,000
Cattle	1,000,000	Other Minerals	5,000,000
Sugar	1,300,000	Wheat	500,000
Coal	590,000	Other agricultural produce	1,000,000
Sacks	280,000	Specie	160,000
Wine	150,000	Sundries	12,000
Tea	160,000	Re-exports	225,000
Hardware	570,000		
Timber	170,000		

MINERALS EXPORTED.

Year.	Nitrates.	Copper in Bars.	Silver.
1886	£3,750,000	£1,550,000	£1,250,000
1888	6,000,000	760,000	1,500,000
1889	7,180,000	3,000,000	900,000
1890	7,320,000	1,500,000	800,000

FOREIGN TRADE OF CHILI (1890).

	Imports.	Exports.	Total.
Great Britain	£4,000,000	£9,000,000	£13,000,000
Germany	2,300,000	1,200,000	3,500,000
France	1,050,000	440,000	1,490,000
United States	600,000	1,600,000	2,200,000
Peru	500,000	420,000	920,000
Argentina	410,000	7,000	417,000
Brazil	140,000	15,000	155,000
Italy	100,000	8,000	108,000
Total	£9,100,000	£12,790,000	£21,890,000

	1887.	1889.	1891.
Exports to Great Britain	£2,208,000	£3,264,000	£3,710,000
Imports from Great Britain	1,980,000	3,130,000	2,000,000

FINANCE.

Budget for 1893.

Revenue.		Expenditure.	
Import duties	£4,000,000	Interior	£800,000
Export duties	4,750,000	Foreign Affairs and Worship	200,000
Land Tax	200,000	Justice and Education	1,300,000
Stamps	150,000	Finance	2,300,000
Post and Telegraphs	150,000	War	1,200,000
Railways	2,700,000	Marine	1,100,000
Storage and Wharfage	50,000	Industries and Public Works	2,500,000
Miscellaneous	200,000		
Total	£12,200,000	Total	£9,400,000

State of the Public Debt (1892).

External Debt	£9,300,000
Internal Debt	4,200,000
Paper Money (legal)	4,000,000
Paper Money (illegal, issued 1891)	4,200,000
Total	£21,700,000

RAILWAY SYSTEM OF CHILI (1892).

Total length of completed lines	1,735 miles.
Estimated value at £5,000 per mile	£8,675,000
Receipts of the State lines (685 miles)	£1,700,000
Expenditure on the State lines	£1,300,000
Number of passengers carried	3,382,000

Telegraphs (1892), 13,730 miles, of which 8,000 belonged to the State.
Telegraph offices, 411 ; messages forwarded, 620,000.
Post Office (1890) : letters, &c., forwarded, 44,000,000.

PUBLIC INSTRUCTION (1890).

Public primary schools, 1,201 ; attendance, 102,000.
Private primary schools, 547 ; attendance, 27,500.
Colleges and high schools : attendance, 6,014.
University and National Institute (Santiago) : students, 1,200.

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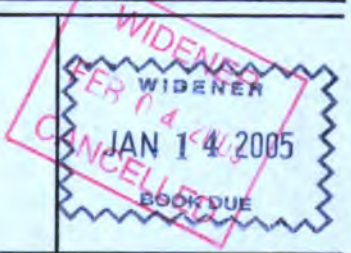

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